Meeting of the Federal Open Market Committee on April 26–27, 2016

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, April 26, 2016, at 10:30 a.m. and continued on Wednesday, April 27, 2016, at 9:00 a.m. Those present were the following:

Janet L. Yellen, Chair
William C. Dudley, Vice Chairman
Lael Brainard
James Bullard
Stanley Fischer
Esther L. George
Loretta J. Mester
Jerome H. Powell
Eric Rosengren
Daniel K. Tarullo

Charles L. Evans, Patrick Harker, Robert S. Kaplan, Neel Kashkari, and Michael Strine, Alternate Members of the Federal Open Market Committee

Jeffrey M. Lacker, Dennis P. Lockhart, and John C. Williams, Presidents of the Federal Reserve Banks of Richmond, Atlanta, and San Francisco, 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
Thomas C. Baxter, Deputy General Counsel
Steven B. Kamin, Economist
Thomas Laubach, Economist
David W. Wilcox, Economist

Thomas A. Connors, Troy Davig, Michael P. Leahy, David E. Lebow, Stephen A. Meyer, Geoffrey Tootell, and William Wascher, Associate Economists

Simon Potter, Manager, System Open Market Account

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

Robert deV. Frierson, Secretary of the Board, Office of the Secretary, Board of Governors

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

James A. Clouse, Deputy Director, Division of Monetary Affairs, Board of Governors

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

Andrew Figura, Ann McKeehan, David Reifschneider, 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

Eric M. Engen, Senior Associate Director, Division of Research and Statistics, Board of Governors; Fabio M. Natalucci, Senior Associate Director, Division of Monetary Affairs, Board of Governors

Antulio N. Bomfim, Egon Zakrajšek,[1] and Joyce K. Zickler, Senior Advisers, Division of Monetary Affairs, Board of Governors; Jeremy B. Rudd, Senior Adviser, Division of Research and Statistics, Board of Governors

Mark Carey,[2] Associate Director, Division of International Finance, Board of Governors; Joshua Gallin, Associate Director, Division of Research and Statistics, Board of Governors

Shaghil Ahmed, Deputy Associate Director, Division of International Finance, Board of Governors

Rochelle M. Edge, Deputy Associate Director, Office of Financial Stability Policy and Research, 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

Burcu Duygan-Bump, Adviser, Division of Monetary Affairs, Board of Governors

[1] Attended the discussion of the relationship between monetary policy and financial stability.

Penelope A. Beattie,[2] Assistant to the Secretary, Office of the Secretary, Board of Governors

Dana L. Burnett, Section Chief, Division of Monetary Affairs, Board of Governors

Bora Durdu,[2] Section Chief, Office of Financial Stability Policy and Research, Board of Governors

Jae Sim,[2] Principal Economist, Division of Research and Statistics, Board of Governors

Andrea Ajello, Senior Economist, Division of Monetary Affairs, Board of Governors

Kelly J. Dubbert, First Vice President, Federal Reserve Bank of Kansas City

David Altig, Kartik B. Athreya, Jeff Fuhrer,[2] and Glenn D. Rudebusch, Executive Vice Presidents, Federal Reserve Banks of Atlanta, Richmond, Boston, and San Francisco, respectively

Tobias Adrian,[2] Michael Dotsey, and Samuel Schulhofer-Wohl, Senior Vice Presidents, Federal Reserve Banks of New York, Philadelphia, and Minneapolis, respectively

Joseph G. Haubrich, Anna Paulson, and David C. Wheelock, Vice Presidents, Federal Reserve Banks of Cleveland, Chicago, and St. Louis, respectively

Richard K. Crump[2] and Marco Del Negro, Assistant Vice Presidents, Federal Reserve Bank of New York

Jim Dolmas, Senior Research Economist, Federal Reserve Bank of Dallas

Nina Boyarchenko,[2] Financial Economist, Federal Reserve Bank of New York

[2] Attended Tuesday session only.

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April 26 Session

CHAIR YELLEN. I suggest that because we're all assembled, we begin. Today's meeting will be a joint meeting 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.

Our first agenda topic this morning is a special session on the relationship between monetary policy and financial stability. I'd like to start off by thanking Mike Kiley and Egon Zakrajšek of the Board's staff, Anna Paulson of the Federal Reserve Bank of Chicago, and Geoff Tootell of the Federal Reserve Bank of Boston. These individuals formed the steering committee that solicited contributions on this topic from across the System and selected the four memos we received as background for today's discussion. I also, of course, want to thank the staff that produced and contributed to these background documents. And so with that, let me turn things over to Jeff Fuhrer, who is going to begin the staff presentations.

MR. FUHRER.[1] Thank you, Madam Chair. I want to begin with the traditional Federal Reserve greeting at events such as this, which is to say I will be referring to the material in your packets labeled "The Linkages among Monetary Policy, Macroprudential Policy, and Financial Stability."

The topic that we will discuss during this session is sprawling, complex, widely discussed, tenaciously argued, and little understood. Its aim is to help us avoid the kind of crisis we just went through. That crisis begat massive unemployment and left in its wake longer-term damage in the form of wealth loss and labor market scarring. We certainly hope we can do better next time, but the question is, how?

We begin by sketching the key features of financial instability on exhibit 2 of the handout. The two main ingredients are rapid growth in debt and in asset prices, most often in the real estate sector. The two can interact with one another in ways that are

[1] The materials used by Messrs. Fuhrer, Adrian, and Sim are appended to this transcript (appendix 1).

no doubt obvious to you by now: Rising collateral valuations and debt issuance mutually reinforce one another. But if the merry-go-round stops and prices drop, an all-too-familiar chain of events ensues: Defaults rise, liquidity seizes, fire sales spread, prices fall further, solvency is threatened, and we lurch into a full-blown financial crisis, complete with a huge recession.

It is unlikely that we will forever avoid the dynamics that have historically led to financial instability, no matter the regulatory environment and no matter who wins the presidential race. Strong capital buffers and other structural tools will make the financial system more resilient in the face of disruptions, but they will likely not eliminate all financial instability and the potential for financial crises. Thus, it is critical to think about how best to minimize the effects of financial disruptions on households and businesses using cyclical, time-varying tools to complement structural tools like capital ratios. A key question is whether monetary policy should be one of these tools.

As emphasized in exhibit 3 in your packet, if macroprudential tools had already proven reliable and fully effective at curtailing financial instability, there would be little need to consider using monetary policy to address financial instability concerns. Other things being equal, it would be better not to charge monetary policy with additional goals beyond those specified in its dual mandate, but instead to allow macroprudential tools, if effective, to address financial instability.

We briefly summarize research on the efficacy of cyclical macroprudential tools in the balance of this exhibit. Developed economies have typically chosen not to use monetary policy to address financial stability concerns. Instead, they have often used housing-related macroprudential tools—notably, loan-to-value, or LTV, and debt-service-to-income caps. Mark Carey's memo examines the effects of such policies in eight advanced foreign economies, or AFEs, and concludes that the effects on borrowing, while mixed, are somewhat hopeful. Those countries that put in place LTV caps saw a decline in LTVs for newly originated loans—you sort of hope that at least that much happens. Reductions in LTVs likely reduced losses to banks, improving somewhat the resilience of the system. The effect of these caps on the trajectory of house prices is less clear.

Exhibit 4 provides some history on LTV caps and house prices. It displays house prices for four AFEs, indexed to 100 in 2010. The vertical dashed lines indicate the dates of the implementation or reduction of LTV caps. Spain and Singapore's LTV caps began in 2000, at the far left side of the chart. You can see that the imposition of LTV caps in these countries left little near-term imprint on the subsequent trajectory of housing prices. In countries whose prices turned down, it was either four years later (as in Singapore, the black line) or in the wake of a wrenching financial crisis (as in Spain, the red line)—perhaps not exactly what was hoped for. It may be that the limited effects of LTV caps to date reflect a too-timid approach, for as long as asset prices are expected to continue rising rapidly, the incentives to continue borrowing are strong. And the longer and higher prices rise, the greater is the risk of price

collapse. This is why slowing price appreciation is a much-desired goal for macroprudential tools.

In view of current uncertainty about the efficacy of macroprudential tools, we consider whether monetary policy can and should be used to address episodes of emergent financial instability, the subject of your next exhibit. To do so, policymakers must be able to detect unsustainable increases in debt and asset prices early enough to take preventative action. They must also have confidence that monetary policy actions of moderate size can have sizable effects on debt accumulation and asset price increases. I would note that these two challenges are also faced by macroprudential policymakers.

With respect to the first hurdle, recent U.S. history is not encouraging, and neither is longer-term global history. It is notoriously difficult to identify undesirable combinations of asset price and debt buildup early enough to take preventative action. The recent experience of this Committee during the buildup to the financial crisis is sobering. The paper summarizes the results of a little trip down memory lane via the transcripts of FOMC meetings in 2005 and 2006. I will not dwell further on painful memories.

With respect to the second hurdle, typical estimates of the elasticities linking the federal funds rate to, say, house prices or household debt appear to be relatively small. This implies that only large movements in monetary instruments would have sizable effects on the evolution of these key variables. And our confidence about policy's effects is especially low during a credit boom or bubble period—how will bubbles respond to a change in fundamentals? It's hard to know.

Whether monetary policy should address financial instability depends in part on how much such actions are estimated to reduce the probability of a crisis and its severity, should it occur. But these benefits must be balanced against the potential for monetary policy to inflict collateral damage on the rest of the economy while seeking to mitigate financial instability. As indicated at the bottom of this exhibit, employing a conventional model, Lars Svensson finds that in almost no case does a monetary policy that leans against the winds of financial instability do more good than harm. We need more research to assess these tradeoffs, but what we know today suggests we might want to tread lightly in using monetary policy to lean against the winds of financial instability.

As discussed in exhibit 6, because both monetary policy and at least some macroprudential tools are likely to remain in the toolkit for U.S. policymakers, we need to consider the interactions between the two sets of tools and their policymaking bodies. Arguably, the longer-run goals of both policies coincide, although the short-run goals differ, and, of course, the tools differ. It is clear that monetary policymakers at the least need to take into account the effects that macroprudential policies might have on employment and inflation. Similarly, macroprudential policymakers need to take into account the effect that interest rate policy may have on risk-taking, borrowing, and asset price appreciation. As illustrated in the diagram on

this exhibit, in view of the potential for multiple rounds of feedback—note the primary policy effects that are indicated by the red arrows and the secondary effects indicated by the yellow arrows—a closer coordination of policies might avoid arm's-length policymaking that ignores or only partially captures the implications of these feedbacks.

Institutional implications of these interactions are addressed in your next exhibit, exhibit 7. Whether monetary and macroprudential policy should be set by the same or different committees, within the same institution or not, and what the makeup of those committees should be are the subjects of much recent discussion. As indicated in the middle of the exhibit, the United Kingdom employs a structure in which two separate committees set monetary and macroprudential policy, but with fairly close coordination. They sit in the same building, and there is high-level overlap in membership across the committees. Whatever the structure, it seems likely that strong cooperation would be beneficial.

Exhibit 8 discusses what to conclude. In light of uncertainty about the effectiveness of macroprudential policies, we should consider the use of monetary policy to address financial instability. However, because it would add another potentially conflicting goal, because recognition of instability is difficult, because the effects of monetary policy on asset prices and borrowing during a boom are uncertain, and because the collateral damage may well outweigh the benefits, we suggest relying least on monetary policy for addressing financial-stability concerns. The first order of business is to make the financial system as resilient as possible, and we hope before facing another episode of financial instability. Macroprudential tools could then be the primary targeted and time-varying approach to slow the buildup of financial imbalances and lower the risk of a crisis. But, as the exhibit notes, we need to do more to improve our confidence in employing macroprudential tools.

Your final exhibit provides a to-do list to that end. It includes expanding the available set of macroprudential tools, shortening the implementation lags of such tools where possible, adding to extant research on the effectiveness of tools and new transmission channels, considering better coordination of monetary and macroprudential policies, assessing the potential for regulatory arbitrage, and developing strategies to mitigate it. Effective implementation of many of these tools may also require greater independence of macroprudential regulators. This is indeed a formidable set of tasks. Tobias will now discuss "Financial Vulnerability and Monetary Policy: The Empirical Evidence."

MR. ADRIAN. Thanks, Jeff. I will now speak about the empirical evidence of financial vulnerability in the risk-taking channel of monetary policy. This presentation is based on work with Nina Boyarchenko, Richard Crump, and Matthew Plosser, all from the New York Fed.

Exhibit 1 explains two views of the relationship between monetary policy and financial stability. One view is that monetary policy and financial stability are separate. In that view, the transmission of monetary policy is via the expected path of

interest rates. Policy rate expectations capture all financial market information, and risk premiums are either constant or move around exogenously. Another view is that monetary policy transmission and financial stability interact. In that view, monetary policy influences risk-taking of financial intermediaries. Risk-taking, in turn, influences financial conditions and vulnerabilities. Financial vulnerabilities matter for the macroeconomy, particularly for the downside risks to the dual mandate. This second view is the risk-taking channel of monetary policy transmission. We review the existing evidence of this channel and present some new evidence.

Before reviewing the so-called risk-taking channel of monetary policy, I will start by reviewing financial stability considerations in the credit channel of monetary policy on exhibit 2. In the traditional credit channel of monetary policy transmission, a lower short-term policy interest rate spurs lending and spending. The credit channel features an amplification mechanism beyond the interest rate channel but does not incorporate risk-taking or vulnerabilities of financial institutions. Empirically, based on a data set spanning 16 advanced economies over 140 years, Jordà, Schularick, and Taylor find sizable responses to lower short-term policy interest rates of credit and house prices. Furthermore, credit growth can threaten financial stability. They estimate that credit growth one standard deviation above its sample mean is associated with a reduction in the level of real GDP by 3 percent. These costs of activity might suggest interest rates should be raised preemptively to slow credit or housing prices. However, increasing interest rates preemptively to slow credit or house price growth potentially comes at the cost of distorting the dual-mandate objectives. Svensson argues that such costs of leaning against the wind always outweigh the benefits. But Svensson's calculations do not allow for the risk-taking channel of monetary policy—the focus of our memo.

Exhibit 3 explains the three key features of the risk-taking channel of monetary policy. First, monetary policy influences the risk-taking of financial institutions. Risk-taking, in turn, determines leverage and maturity transformation, which are vulnerabilities for the system. Second, risk premiums are endogenous and time varying. Put differently, the pricing of risk determines financial conditions. Third, endogenous risk-taking increases downside risks to real activity. Hence, financial vulnerabilities create risks to the dual mandate.

Exhibit 4 presents the existing evidence on the risk-taking channel, which relates the stance of monetary policy to the risk-taking of financial intermediaries. A number of studies have examined different dimensions of risk-taking, finding that U.S. banks ease lending standards and charge smaller premiums to riskier borrowers during periods of easy monetary policy; a similar result has been found for European banks. Ex ante risk-taking as measured by the risk-rating of the bank's new loans is negatively associated with increases in short-term policy interest rates. Furthermore, balance sheets of nonbank financial intermediaries tend to expand when monetary policy is expansionary. In sum, existing empirical evidence shows that looser monetary policy increases financial intermediaries' risk-taking.

We next turn to additional evidence from financial markets. Exhibit 5 presents evidence that monetary policy announcements are associated with significant increases in financial market volatility. The figure shows the variability of financial indicators on FOMC announcement days in red triangles and the variability on all other days in blue circles. The x-axis indicates the specific financial indicators, while the y-axis presents the variability as measured by the average absolute two-day change in units of standard deviations. The first two indicators, the ACM path and the BHP path, represent estimates of the expected near-term path of policy. The third and fourth indicators, the ACM and the BHP term premiums, show metrics pertaining to Treasury term premiums. They indicate that variability of the expected path and of term premiums is significantly higher on FOMC announcement days. The fifth and sixth indicators show the variability of the equity market return and that of the bank stock return. In these cases, there is not significantly higher variability. The seventh and last indicator is equity market implied volatility as measured by the VIX. In addition, in the memo we show that variability is significantly higher even after controlling for news about monetary policy.

Exhibit 6 provides background on our thinking about financial vulnerability. We use a measure of vulnerability called CoVaR. CoVaR is defined as the value-at-risk of the financial system conditional on the distress of a particular financial institution. CoVaR as a summary measure is correlated strongly with measures of leverage, maturity transformation and liquidity transformation, as well as other measures of vulnerability. Financial vulnerabilities are amplification mechanisms that can generate systemic risk, defined as the risk that the intermediation capacity of the financial system as a whole becomes impaired.

Exhibit 7 summarizes our main empirical results from regressions of two-day bank equity returns on an announcement-day dummy, a measure of changes in the expected path of interest rates, a measure of the term premium, CoVaR, and associated interaction terms. Our empirical approach exploits differential cross-sectional variation in asset prices—here, bank equity returns—around FOMC announcements relative to non-announcement days. Monetary policy announcements significantly affect the performance of bank equity returns, and even more so for firms with higher CoVaR. A 25 basis point increase in the expected path of interest rates on an FOMC announcement day, on average, lowers bank equity returns 36 to 50 basis points. A 15 percent increase in the term premium risk on an FOMC announcement day lowers bank equity returns 8 to 13 basis points. Comparing the most vulnerable with the least vulnerable banks, the decline in returns in response to either a higher expected path of interest rates or a higher term premium is 20 to 24 percent larger than for more vulnerable banks. Our results thus show that there is significant interaction between monetary policy announcements, the evolution of term premiums, and the performance of relatively vulnerable institutions.

Let me conclude on exhibit 8. The empirical evidence that I presented today is consistent with the risk-taking channel of monetary policy transmission. Easier policy increases risk-taking, compresses risk premiums, and thus could create financial sector vulnerabilities. These findings suggest further work to quantify the

effect of risk-taking on downside risk to the dual mandate. Incorporating the risk-taking channel in macroeconomic models might change the tradeoff regarding preemptive moves in interest rates. Next, Jae Sim will talk about such macroeconomic models in the presentation "Monetary Policy and Financial Stability: Lessons from DSGE Models."

MR. SIM. Thank you, Tobias. As highlighted in exhibit 1, the central question of our memo, written with coauthors Bora Durdu and Matthias Paustian, is what advice a range of DSGE models have to offer about the appropriate response of monetary policy to financial imbalances.

The literature has offered a range of perspectives, highlighted in exhibit 2. One strand emphasizes the idea that various frictions in credit markets lead to inefficient saving and investment decisions and may contribute to excessive volatility in employment or inflation, calling for a role for monetary policy to lean against excessive credit fluctuations. This view is often rationalized with the notion that monetary policy transmission partly involves changes in bank risk-taking.

The second bullet of exhibit 2 illustrates one example of how the risk-taking channel works. Low interest rates may tilt the capital structure of banks toward more debt, which then gives banks an incentive to choose riskier projects, as the higher leverage increases the value of banks' default option. If credit expansion is accompanied by increased spending and inflation, a central bank pursuing conventional dual-mandate goals automatically stabilizes the financial system. However, such divine coincidence may not exist in reality. While a blunt tool, monetary policy may "get in all the cracks." Accordingly, monetary policy should react to a measure of financial imbalances, such as the credit-to-GDP gap or credit spreads. However, the increase in interest rates required to curb risk-taking may be greater than what is needed to attain price stability and maximum employment.

Exhibit 3 highlights some of the factors weighing against the use of monetary policy to lean against financial imbalances, including the issue of coordination with macroprudential policies. In many DSGE models, monetary policy is an indirect tool with which to address the underlying microeconomic distortions leading to inefficiency. Depending on the source of inefficiency, macroprudential tools may more directly affect the underlying distortion. For example, distortions related to inefficient leverage of financial institutions may be addressed more directly through capital requirements, and the presence of robust, countercyclical capital requirements may eliminate the role for monetary policy, as stressed by Collard, Dellas, Diba, and Loisel. These authors also show how the combination of monetary and macroprudential policies can improve economic outcomes, a topic I will touch on later.

A central challenge confronting the use of monetary policy to lean against financial imbalances is the measurement of the relevant imbalance, the topic of exhibit 4. DSGE models differ in the imbalances they emphasize. Even focusing on an individual imbalance, such as the ratio of nonfinancial credit to GDP, raises

difficulties. The figure shows that real-time estimates of the credit-to-GDP gap, shown by the green line, can substantially differ from the final estimate, shown by the purple line, indicating the risk that any attempt of monetary policy to "lean against the wind" may be informed by noisy and imperfect assessments. Of course, this issue also applies equally to the measurement of resource utilization in the pursuit of conventional monetary policy goals.

So far, my discussion has been largely qualitative, in line with much of the literature. Our memo emphasized some of the quantitative lessons from the literature through simulations of a model I developed with Michael Kiley. As highlighted in exhibit 5, in this model, financial intermediaries choose their leverage ratio in a manner that maximizes their own profits but fails to take into account the social costs imposed by these choices. Importantly for our purposes, the model is estimated and contains many of the features relevant for monetary policy analysis, allowing for a quantitative evaluation of the potential for monetary policy to lean against the credit cycle.

Some of our results are presented in exhibit 6. The impulse responses of output, hours worked, and inflation show the response of the economy to a reduction in perceived risk facing financial intermediaries. The black lines, showing essentially no response, represent the efficient outcomes: Changes in idiosyncratic risk should lead to no movement in the macroeconomy under ideal conditions because diversification would insulate the economy from such idiosyncratic factors in the absence of inefficiencies in financial markets. However, a credit boom follows the shock under a standard inertial Taylor rule approach to monetary policy, as shown in the blue lines. Augmenting the monetary policy strategy with a term reacting to the credit-to-GDP ratio, shown by the red lines, helps stabilize the credit cycle and limit the fluctuations in the labor market and inflation that otherwise would ensue.

As we emphasized in the memo, not all, and probably not even the majority, of fluctuations in credit reflect inefficiencies—rather, credit fluctuations are due importantly to the savings and investment choices of firms and households trying to manage the time profile of consumption, the adoption of new technologies, and other factors. As a result, the quantitative importance of a role for monetary policy in leaning against the wind depends on the relative importance of different factors. The figure in exhibit 7 summarizes the overall performance of the economy under monetary policy approaches that do not lean against credit and those that do lean against credit, as implied by the model. More complicated analyses that take account of the full range of shocks that can hit the economy find that, if the optimal monetary policy already responds to output, inflation, and the lagged funds rate, there's little to be gained in terms of improved macroeconomic performances by adding the credit-to-GDP ratio to the rule. This is in stark contrast to the Ramsey allocations shown at the bottom. The Ramsey allocation with only a monetary policy instrument, shown by the green dot, achieves a significant efficiency gain. As shown by the red dot, with an additional macroprudential instrument implemented by a time-varying leverage tax, the planner achieves even greater efficiency gain. Such large efficiency gains are feasible when the planner directly responds to driving sources of credit

cycles, distinguishing inefficient credit cycles from efficient ones, but may not be achieved when a monetary policy rule reacts to endogenous fluctuations in the credit-to-GDP ratio.

As I mentioned earlier, the types of inefficiencies emphasized in DSGE models often point to a role for macroprudential policies. Earlier, Jeff Fuhrer reviewed some of the resulting coordination issues. The DSGE literature has also confronted these issues, and I discuss a sample of this literature on your final exhibit. De Paoli and Paustian study a setting in which separate institutions conduct monetary and macroprudential policies, respectively, and each institution is assigned only a subset of the stabilization objectives that are relevant for welfare. They identify three circumstances in which the coordination problem can be made less severe: First, when both authorities have effective instruments, the monetary authority can operate independently, taking as given macroprudential policymakers' effective mitigation of credit distortions; second, if both authorities credibly commit to actions in the future; and, third, if the macroprudential authority does not review instrument settings as frequently as the monetary authority, this can take macroprudential tools as fixed in the short run. However, we note that this literature has not yet reached a strong consensus on these questions.

That concludes our prepared remarks. We would be happy to answer your questions. Thank you.

CHAIR YELLEN. Questions for any of our presenters? President Lockhart.

MR. LOCKHART. Thank you, Madam Chair. A question for Jeff. Just to go back to your very first exhibit, exhibit 2. Back in the '70s there was an event called "Bankhaus Herstatt" that involved missed payments. And it may have been hyperbole, but at the time, there was concern that the payment system would break down, and it would create a financial instability event. Did you consider payments in thinking about these sort of high-level definitions?

MR. FUHRER. There's a bit written about that. We did not spend much time in our memo discussing the possibility of payment-system disruptions, but there are folks who are worried about that. To date in the United States, I think, that has not been a terrific problem, and around the world, while there are some examples, that has not been nearly as prominent a problem as the accumulation of debt with rising asset prices. But it's a fair point, that that is another possible margin of vulnerability.

CHAIR YELLEN. Thank you. Other questions for the presenters? President Rosengren.

MR. ROSENGREN. Jeff in his presentation talked about monetary policy being the "third resort." I would just be interested if each of the paper-givers agree that "third resort" rather than "never" would be your answer. And if "third resort" would be your answer, what is the most likely scenario in which you think that third resort would actually apply?

MR. FUHRER. Somehow I knew Eric was going to ask that question. [Laughter] I think one word that I didn't use during my presentation but is essential to keep in mind is "humility," in that none of us, I will submit, know exactly how macroprudential tools work, whether circumstances might arise in which monetary policy was the best option available, and how that would work during such an episode of financial instability.

My imagination is fertile enough that I can imagine circumstances in which either we have chosen not to or are unable to pursue what we call our first choice—that is, use cyclical time-varying macroprudential tools—and yet we have identified what we think are troublesome buildups of financial instability. And if we are constrained in that way, it is conceivable that we would use monetary policy to address it, with due concern to the issues that are raised in the paper and in the briefing. First, critically, freighting monetary policy with an additional objective that may be competing with its other objectives—we already have tradeoffs to make within the dual mandate—is not to be done lightly. And the second is—until research overturns this result, if it is found to do so—the possibility for collateral damage or the possibility that modest movements in monetary policy instruments will have little or no effect on the very strong incentives that build up in a financial boom. Those considerations are to be taken seriously, but if we are so constrained, I can imagine that that's a resort—not never, but a last resort.

MR. ADRIAN. Lars Svensson's cost-benefit analysis has had a big effect on many people's thinking on this topic, and one of the things that I learned from reviewing Svensson's work is that the relative size of the costs and the benefits depends on the magnitude of the shock. And so what he basically shows is that, when you think that the crisis is very, very large, then actually the costs are relatively higher than the benefits. But if you think that the crisis is not as large—think about a crisis on the order of an unemployment increase of 5 percentage points versus a crisis on the order of an unemployment increase of 2 or 3 percentage points or something like that—this cost-benefit calculation can flip around. So, intuitively, the cost is sort of first order. The distortion of leaning against the wind relative to the dual-mandate objectives today is a first-order cost while the benefit is second order, but when the magnitude of the crisis is not as large, the benefit can actually be larger than the cost.

One point I would make is that this is important in the context of the magnitude of prudential regulation. If prudential regulation is inadequate, you would think that the tail risk is very large, and hence you don't want to use monetary policy. But if prudential policy is actually at a more stringent level so that the tail risk of the financial crisis is smaller, the cost-benefit analysis actually tells you that leaning against the wind is relatively more beneficial, which is somewhat counterintuitive, but that comes directly out of this analysis.

The second point is, our memo basically shows that there's a tight interlinkage between monetary policy transmission and financial stability topics. I think that taking these interlinkages seriously in our thinking about macro models is very important to really understand threats to the downside risks of the dual mandate, along lines similar to the memo that Jae Sim described.

MR. SIM. I don't have completely different views from those of the first two speakers, but I have several points to raise for consideration. I think it's possible that the monetary policy

interest rate becomes the first, second, or even third resort, but it's not crystal clear in which direction to use monetary policy to ensure financial stability.

Let me remind you that from the second half of 2004 to the second half of 2006, the Federal Reserve increased the policy rate 450 basis points. Now, there is some empirical evidence that the increase decelerated the expansion of the balance sheet of the commercial banking sector. However, there is some evidence that the deceleration in the expansion of commercial banks' balance sheet caused lending activity to migrate to the unregulated shadow banking sector. So it is not always clear that the use of an increase in the monetary policy rate will always bring financial stability.

Another reason to think about the use of monetary policy is that, during the period from 2004 to 2006, the increase in interest rates created huge interest rate differentials between different continents, between Europe and the United States and between Japan and the United States. That really accelerated capital inflow to the U.S. market. There may be some situations in which you may want to lower the interest rate to fight carry traders whose behavior may enhance financial stability. So it is not always one direction.

Another point that I want to make is that, in a situation like the current one, raising the interest rate because of financial stability concerns may weaken the credibility of your commitment to the 2 percent inflation target. That was a substantial concern in Sweden a few years ago.

My last point is that there can be a situation in which monetary policy can be an important tool to achieve financial stability. That is, when the economy reacts to a shock in a history-dependent way—for instance, if the response of the economy to a given size of the shock depends on the credit history of the economy—then there may be a stronger case for leaning-

against-the-wind monetary policy to reduce the tail risk. However, that should be empirically tested before it is brought into the actual policy arena.

CHAIR YELLEN. Thank you. Further questions?

MR. FISCHER. Yes. When you sit around discussing a crisis with veterans of crises, which I have done, they all have words of wisdom for you, and the wisdom is typically not "debt is a big problem," it's "the problem is leverage." Do you know how to differentiate between those two and tell us which one is more likely to be correct?

MR. FUHRER. I'll take a stab at it. I think the historical evidence says that, yes, leverage certainly matters. So having really risky leverage ratios, borrowing a whole bunch against an asset whose price can fluctuate significantly, that is the problem. I think that's fair. If the leverage ratios weren't so troubling and there was some borrowing and the asset price moved, perhaps we wouldn't get into quite as much trouble. I think that's a fair distinction to make. That said, when assets prices are increasing rapidly, the historical evidence of the past eight centuries or possibly more is that concern for leverage ratios tends to go out the door because, after all, that ratio is going to look better, and the coverage of the asset price is going to look better next year and the year after and the year after. That's the historical experience, and we seemed very capable of getting ourselves into that kind of trouble. But your distinction is fair, and if you were to observe that the leverage was not as severe, that might not portend as serious a problem.

MR. FISCHER. Okay. Thank you.

CHAIR YELLEN. Okay. Why don't we begin our go-round. There are some discussion questions that were circulated, but I look forward to your comments. Let's begin with Governor Tarullo.

MR. TARULLO. Thank you, Madam Chair. In the past, President Evans has noted that answering the questions posed by the staff in a special topic discussion is a rookie mistake. [Laughter] So, while I do want to begin this discussion by addressing those questions, I'm going to be careful not to answer them, and instead I am going to question some of the premises that lie behind the first question and then underscore the importance of the direction in which I think the second question leads us, albeit with some modifications in that premise as well.

The first point is, I would take some issue as a factual matter with the assertion in the first question that there is an emerging consensus that macroprudential instruments are the primary means through which policymakers should address financial stability issues. In purely numerical terms, there may be a majority for this view, especially among long-time monetary policy economists, but there are quite a few other voices, some of whom have been cited by Tobias and Jae in their presentations today, who I think would argue for a considerably more important role for monetary policy in protecting financial stability. So I would urge people to pay attention to the nuance in the presentations that were given today and in the background papers. I do resist this notion of a consensus. Maybe it's true numerically. But that's not a consensus, that's just a majority. I think it sweeps aside important questions that have been raised in the background memos.

Having said that, I do want to reinforce the suggestion that is implicit in the second question: The FOMC should be considering, in a somewhat systematic way, how we might respond to specific circumstances in the world as we find it—not in our idealized world, but in the world as we find it—where we could face some difficult tradeoffs between traditional monetary policy goals, or at least monetary policy goals as they've been traditionally understood, and financial stability. Let me say at the outset that while I resist the premise that a consensus

has emerged on the conceptual issues pertaining to monetary policy and financial stability, I myself don't, at present, hold a position on the other side of that purported consensus. It's just that I think the issues bear considerably more discussion, including how they may relate to our overall conduct of ongoing monetary policy and not just a few decisions in a few discrete moments.

Let me also say that I'm not going to try to cover a lot of issues, like the importance of building *ex ante* resiliency in the financial system, the effect of global capital flows on financial stability, the limited value of precedents provided by countries in which financial intermediation is predominantly bank-centered when thinking about the U.S. position, and the very real constitutional, legal, and political factors that could be raised by the creation of new policy instruments. I've got enough to say just on the narrower issues as it is.

In trying to explain why I find myself reacting against that premise in the first question, I did find myself thinking about why I've thought what I regard as a kind of conventional monetary policymaker's response to financial stability is an incomplete or perhaps premature one. I want to try, at the risk, obviously, of some oversimplification, to characterize that response. This is not being imputed to the staff or the memos. And I think you've all heard a variant on what I'm about to say.

That response is composed of, I think, four or five parts. One, monetary policy is too blunt a tool to counteract asset price bubbles because it would adversely affect other parts of the economy. Two, indeed, the amount of monetary policy tightening that would be needed to counteract asset bubbles by the time they develop would be so substantial as to risk bringing economic growth to a screeching halt. And, therefore, three, supervisory and other regulatory tools should be relied on. And, finally, four, if serious financial stress or a full-blown crisis

nonetheless occurs, then monetary policy can be brought to bear to try to mitigate its effects. A variant on this position is that monetary policy may be held in reserve as a "last resort" if financial stability risks are high enough and other tools are ineffective.

What I'm now about to do is to give you just a partial and only a suggestive list of some of the reasons why I do find the position I've just characterized—or caricatured, depending on your perspective—less than fully satisfying. But let me again emphasize that it's quite possible I would emerge from the kind of analytic exercise I'm suggesting with a similar view that monetary policy actions explicitly for financial stability purposes might be the unusual rather than regular case.

First, I think the position as I just stated it rather elides the important question of whether monetary policy has itself been an important contributor to the buildup of financial stability risks. And, as was evident in the background memo, the models traditionally associated with monetary policy gave very little independent significance to the financial system, to the apparently asynchronous nature of business and credit cycles, and to other salient factors. Indeed, this is slightly unfair. It's hard to escape the observation that the traditional monetary policy view failed to see the seriousness of the risks building 11, 12, and 13 years ago. For example, one might at least ask the question whether the failure of accommodative monetary policy to effect significant improvement in economic growth and employment in the absence of inflation may sometimes be due to an absence of sufficient numbers of promising projects to increase capacity and the consequent diversion of abundant liquidity into asset markets rather than toward increasing productive capacity or innovation. Such metrics as historically high asset value levels, substantial increases in the amount of credit extended in the economy, and the increasing leverage of financial intermediaries could buttress such a case.

Second, and related, is the more basic question of how monetary policy is transmitted in the first place. The background memo did a very nice job, and Tobias Adrian underscored some of this today in drawing our attention to the distinctions between New Keynesian and risk-taking channels' transmission mechanisms for monetary policy. Those favoring a dominantly New Keynesian model will understandably see less likelihood both of monetary policy contributing to financial stability risks and to its efficacy in counteracting them. But if a risk-taking channel is an important transmission mechanism, one's conclusions may be different. Our former colleague Jeremy Stein continues to churn out interesting papers that give increasing credence to variations on this view. Here I take note of the fact that the traditional view tends always to find the cost of monetary policy adjustments made for financial-stability reasons to be higher than its benefits—this is the Svensson hypothesis that Tobias Adrian was talking about—by assigning a very low probability of a financial crisis at any point in time. But if the buildup of financial stability risk is substantially endogenous to monetary policy, this argument for rejecting monetary policy as a financial stability tool becomes less persuasive.

Third, and even more foundational, is the question of whether the secular increase in the debt-to-GDP ratio since World War II, whatever its causal relationship to slowing potential economic growth, may warrant an evolution in how we think about monetary policy, particularly because credit booms tend to be followed by deeper recessions and slower recoveries, and particularly if we believe we may be facing a prolonged period of slower economic growth and low productivity gains. These last two points have been examples of how thinking about financial stability may not be the addition of a new policy aim, but instead something which is inherent in and important to the traditional dual mandate.

Fourth, the relatively easy answer of the traditional view that other tools should be relied on not only glosses over the important question as to whether those tools exist, but also the question of how effective they might be even if we had them. I do think it plausible that macroprudential tools directed at real estate lending could be effective in some circumstances, putting aside for the moment the important questions of who should have those tools and whether they would be wisely used. But this view is based on the unusual characteristics of real estate lending, including the term of mortgage instruments, the relative illiquidity of its collateral, and its simple pervasiveness. And, of course, with the large fraction of mortgage credit extended by nonbanks, an effective policy instrument would have to apply to mortgage lending from all sources. My suspicion is that whatever one's conclusions on the broader issues I am raising now, there will be a pretty good theoretical case to be made for something along the lines of macroprudential instruments for real estate lending. Whether our political circumstances and legal system can comfortably accommodate it is another story entirely.

On the other hand, it does not seem at all clear to me that other assets are so segmented and thus susceptible to targeted measures. That is, I suspect that to some degree taking steps against some perceived asset bubbles will be rather like squeezing on a water balloon. The liquid will simply slosh around to another part of the balloon unless you squeeze hard enough to burst the whole thing. The question of whether asset markets other than real estate are sufficiently segmented as to be managed through targeted sectoral or other measures is a very important one and one that I think, up to this point, has been underresearched. If the answer is generally negative, then the only macroprudential measures that are likely to work would be something akin to interest rates, such as taxes on widely used funding channels.

Another relevant point here is that when traditionalists concede that monetary policy might be used as a last resort, they cannot mean that in a purely temporal sense. If there really is a buildup of highly intermediated credit supporting unsustainable asset prices, waiting until it's clear nothing else has worked would indeed likely require huge interest rate jumps to have an effect. Imagine waiting until late 2006 and then saying, "Well, nothing else has worked, maybe it's time to try monetary policy." It would actually, of course, have led to exactly the wrong monetary policy response at that moment in time. It seems quite likely to me that if monetary policy is to be used effectively without risk of substantial, unnecessary collateral damage, it will need to be used earlier rather than later, when its signaling effects may help have an effect beyond what our models suggest a 25 or 50 basis point increase would have.

Turning now much more briefly to the second question posed by the staff, I very much want to reinforce the importance of asking ourselves how we would approach the question of whether and how monetary policy decisions should be affected by the financial stability considerations mentioned today well in advance of a time—unlike, in my view, the present moment—when that issue may be highly relevant. The staff question implies that we should do this because the optimal macroprudential tools may not be available. I would reserve judgment on that point. Indeed, I think the exercise itself may help inform our understanding of some of the more foundational questions to which I have alluded.

While everyone is entitled to her or his opinion on what statutory changes may be desirable, I think our first responsibility lies in considering how we would execute the powerful but limited statutory tool that the Congress gave the FOMC, taking the world as it is at that moment rather than how we would like it to be, just as we do with fiscal or other economic policies that some or all of us might prefer to be different than they are. Obviously, there's a

subset of the FOMC—to wit, the members of the Board—that has a different set of tools, and we presumably would be in a position to communicate to the FOMC what our actions and intentions are. But even then the communication channels may not be perfect, because there are other parts of the government that have other tools that may be disinclined to as much communication and perhaps even more disinclined to cooperation. I think those are all reasons why we need to hypothesize that we're not going to be in a textbook situation, but instead one that has substantial frictions in the perception of what's going on and the implementation of policy.

I don't think we can do full justice to this responsibility in a single discussion today, so I would suggest more of an ongoing project involving work by Governor Fischer's and President Rosengren's financial stability committees—sorry, guys, I didn't let you know beforehand I was going to suggest this. I think we might profitably begin with a retrospective view of an actual decision point rather than a hypothetical view of a future one. My candidate would be sometime during 2003 when inflation was quiescent, the economy was taking quite a while to recover from what had been only a mild recession, but when prices and leverage across a wide range of assets, not just real estate, were already well into the high end of historical ranges. Gaming out the optimal response at that time could be a very useful heuristic exercise in preparing for a parallel moment in the future when sluggish economic growth and low inflation coexist with rapidly rising asset prices and credit and leverage extension. Thank you, Madam Chair.

CHAIR YELLEN. Thank you very much. President Rosengren.

MR. ROSENGREN. Thank you, Madam Chair. I want to thank the Chair and the Vice Chairman for placing this topic on the agenda and the staff for their very thorough briefing papers on the subject. I'll only discuss the questions posed to us now and will discuss some more specific concerns in the financial stability discussion later in the agenda.

To the first question, do we have the right tools or governance to address financial stability concerns? As the staff papers discussed, financial instability has tended to occur when there is significant borrowing against an asset whose value has declined substantially. Financial instability, both domestically and internationally, has been most commonly associated with real estate assets, either residential or commercial. As a result, many emerging economies and, increasingly, many developed economies, have used loan-to-value and debt-to-income caps as their main macroprudential tools, as Mark's paper discussed. For example, in 2014, the Bank of England Financial Policy Committee set debt-to-income caps to address some of its concerns with escalating prices in real estate markets.

The QS report that we will discuss later today does not address these most commonly used tools because the Congress has not given any regulatory body the authority to set such caps across all financial institutions in the United States. Without a direct way to influence levered purchases of real estate across all financial institutions, the Federal Reserve is left with only tools that build resiliency to a real estate price decline over a subset of intermediaries, lending, and real estate markets.

The tools that policymakers do have are subject to diffuse governance. Because real estate loans are conducted by a wide variety of intermediaries, bank and nonbank, it is unclear that altering regulations that affect only banking organizations will be as effective as might be desired, in view of the potential for regulatory arbitrage. And any changes, even for banking organizations, require concurrence among bank regulators that have historically not been focused on financial stability concerns. As a result, there will likely be long delays in implementation and final actions that are heavily compromised compared with original intent. A good example is the 2006 real estate guidance, which took two years to negotiate and was substantially watered

down when it was finally issued. The result was a rather timid response to a period of significantly heightened risk to financial stability. So my answer to the first question, in short, is "no."

Question two, should financial stability goals affect monetary policy deliberations? Monetary policy tools, both interest rates and our balance sheet, should be focused on our dual mandate. However, even this narrow focus can be distorted by actions of others. For example, both in the United States and most other developed countries, economic policies have been overreliant on monetary policy tools. This is not by choice. Fiscal authorities have chosen to react little to the shocks to the global economy, which has forced monetary policy to extremes to meet its legislated mandates. Had fiscal policy been more aggressively deployed, we might not have seen so many countries at historically low interest rates for such an extended period.

Ideally, financial stability concerns would be addressed with supervisory or macroprudential tools, but their effectiveness and our ability to react speedily to building pressures are highly uncertain. Diffuse governance makes their deployment even more difficult. Hence, if macroprudential tools were not used to offset increasing risks of financial instability, I would be left with a dilemma, not unlike the problem we have faced with fiscal policy. The Congress has given the FOMC only the ability to influence interest rates on the balance sheet. If serious financial stability concerns were not being addressed by those who do have financial stability tools to deploy, I would have to consider using monetary policy to address any financial stability concern that could adversely influence the policy of employment and inflation over time.

We might, thus, be forced to address building instability with either somewhat higher interest rates or reducing our balance sheet somewhat more aggressively. One can certainly

argue that a more effective structure is provided by the Bank of England, in which monetary policy, supervisory policy, and financial stability policy are more integrated, and a more comprehensive flow of information occurs between different areas of the bank. Such a structure would likely make the need for using monetary policy to address financial stability concerns much less likely. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Fischer.

MR. FISCHER. Thank you, Madam Chair. I'd like to start by thanking the authors of the four papers and all of the other staff who have worked on this project, which was designed—and, on the basis of what the first two speakers said, successfully—to make members of the FOMC think about important policy questions related to financial stability. And I'd also like to thank the people who provided the expositions today. The slides are really very, very good. If I'd only known they were coming, I wouldn't have had to read the memos. [Laughter]

MR. TARULLO. That's the problem with good in-class presentations. [Laughter]

MR. FISCHER. Most central bankers, when asked whether monetary policy should be used to deal with problems of financial stability, reply that they would prefer to devote monetary policy—defined typically as the monetary policy interest rate, but it could be unconventional policy tools as well—to attaining the major macroeconomic policy goals, which, in our case, are maximum employment and stable inflation. They go on to say that they would use macroprudential policy tools to deal with potential financial instability.

This, as noted in the fourth paper—in which Mark Carey updated earlier work by David Aikman and others—is how macroprudential policy has been used in and after the Great Recession to deal with incipient financial instability, particularly in the real estate sector, in several mainly small countries. The financial systems in most of these countries remained

reasonably healthy through the Global Financial Crisis. Most of the countries had reduced their interest rates to very low levels during the crisis to prevent large-scale capital inflows they would have faced had they left their interest rates at the levels most suitable for the nontraded sectors of their economies. But because their interest rates were very low and their financial systems healthy, the demand for housing finance rose rapidly, and the public flocked to take out low interest mortgages. Housing prices rose and continued rising for some time. Well, what was to be done? If some financial-sector regulator or regulators had the authority to impose macroprudential measures on housing finance by setting maximum loan-to-value ratios or debt-to-income ratios, or by requiring mortgage lenders to raise the risk rating of mortgages, the authorities could impose such measures. Examples are presented in the fourth paper we received.

These measures appear to have met with mixed results. In several countries, house prices continued rising rapidly. But as pointed out by Fuhrer and others, borrowers with a lower LTV ratio have a larger cushion of equity and are therefore protected against subsequent declines in the price of houses. Further, as noted in the Carey paper, some studies have found evidence of effectiveness, and hints are emerging that macroprudential policies can have more effect on vulnerabilities associated with debt volumes and riskiness.

Well, so far so good. These are cases of countries whose central bank is using the interest rate to attain its macro goals, and some entity, usually the central bank, has the macroprudential tools to deal with resultant threats to financial stability. Presumably, if there were other asset markets behaving in a manner that seemed a threat to financial stability, they could be dealt with via additional macroprudential instruments. And taken to the limit, all in all, this sounds like the policy literature of an earlier era when a policymaker faced with *X* goals

needs *X* noncollinear tools to attain them, although, unfortunately, there is one tool missing in this story: The central banker has only the interest rate through which to influence both inflation and employment.

What if the country doesn't have a full array of macroprudential measures? In discussing this question, we need to remind ourselves that we are generally dealing with markets in which lending and borrowing is a central activity, and which are, therefore, to some extent, influenced by changes in the interest rate—that is, by macroeconomic and monetary policy.

What if financial markets generally seem to be overheating and financial instability seems to be threatening to become a macroeconomic problem? There are at least two reasons why the interest rate could then become the best instrument to deal with the financial stability problem. First, it may be much more efficient to raise the interest rate than to try to deploy a wide range of macroprudential measures, one aimed at each deviant market, both because managing a wide range of macroprudential measures would require extensive coordination and because the operation of each macroprudential tool certainly also has an effect in other markets. And so you would be getting into a mess, I believe, of using a lot of instruments when one of them, the interest rate, would suffice to deal with a large part of the difficulties that are causing the financial stability problem. And the second reason that it may be useful to use the interest rate is that there may be too few macroprudential tools to deal with the generalized financial overheating problem with which the authorities have to contend.

I would, by the way, just like to make an academic point, but I think it's important even so—I usually think academic points are important. In footnote 7 on page 5 of their paper, Fuhrer and others state that, "Many developing economies do not enjoy an independent monetary policy to address either macro stabilization or macroprudential concerns. As a consequence, they have

used macroprudential tools much more heavily than have advanced economies." Well, in those country cases with which I am familiar, that's not the story. It is not that developing economies do not enjoy an independent monetary policy, but rather that they have more macroprudential tools at their disposal than do many of the advanced economies, including the United States, and therefore use these tools more actively.

Now, in the case of the United States, the Federal Reserve and even the FSOC have relatively few macroprudential tools. One solution to that problem has been emphasized by those implementing the Dodd-Frank law: to strengthen the institutional structure of the financial system as much as possible, for instance, by requiring much higher capital ratios than existed before the crisis, and through a host of other measures with which the regulators and the regulated have been struggling over several years. That will, no doubt, help a great deal. This is what the Fuhrer and others paper calls "earthquake" measures—that is, make your buildings stronger so that they can withstand an earthquake. And, as some have pointed out, stress tests can also, to some extent, be used as macroprudential measures, though I think using them would take probably quite a long time, and they might not be very useful. But not only do we have few macroprudential measures in the United States to deal with the banking system, we also have very few to deal with the shadow banking system—that is, we have a serious problem.

Now, to answer the questions posed by Michael Kiley and others at the beginning of the package of papers we received—it is on page 28 of 28 in today's handout. Number 1(a): "No," policymakers in the United States do not have a sufficiently powerful set of macroprudential tools to ensure financial stability most of the time. For 1(b): "Yes," there is a useful distinction between structural, which are "earthquake" measures, and cyclical, which are called "malaria" measures in the paper—between structural and cyclical tools for dealing with risks. Third, is

coordination among U.S. financial regulators potentially a problem in the use of macroprudential tools? I think this question was put in just to check whether the reader was awake? [Laughter] "Yes."

For 2(a): I would support using the stance of monetary policy to pursue financial stability goals in the circumstance in which the problem of financial instability is reaching macroeconomic proportions and cannot be addressed with other tools. I would view such a use as being consistent with the maximization of an expected utility function, dependent only on inflation and output over the course of time. In other words, we may have to give up some utility in terms of attaining our inflation and output goals today to produce higher utility in the future. And I find the argument that, well, we would have to raise the interest rate so high to deal with this problem, as quite a complicated and possibly inconsistent one. What it is saying is, "Yes, we can mop up cheaply." Well, we are still trying to mop up cheaply, and we haven't done it yet. So I don't think that the argument, "Well, you can't do it at some point because it really becomes extremely expensive," may be a way of keeping us out of political trouble but is not entirely logically correct. And 2(b) is, "When will we want to do this?" It is very hard to know today when such policy adjustments would be called for. Most likely they would be called for in relation to problems in housing and real estate markets, and most likely we would be taken by surprise by such an event even after talking about it for a long time.

Well, how can we prepare for future financial instability? First, by strengthening the structure of the current financial system as the regulators have been doing and have been doing well. Second, I think we have got to recognize some political realities. There is a line about how the macroprudential regulators should be made independent. You make independent regulators who are controlling housing and see how long the independence will last. It's a very tough

problem to be a macroprudential regulator focused on a particular sector, and I am not sure we could rely on that. You know that in the Bank of England, the Treasury is more represented, I think, in the Financial Policy Committee than in the Monetary Policy Committee, and that's because they regard it as more of a political issue.

But I think—and this goes along with what Governor Tarullo suggested a few minutes ago—we can prepare for future financial instability by doing research on how to strengthen our existing macroprudential tools, of which we don't have many, and by asking what other tools we need to add to our collection of policy instruments. We may not want to have a whole lot of them because I think you then get in a very complicated institutional setting when you decide to change seven instruments in order to stabilize the financial system. And, as was also emphasized by Dan, we can also prepare by asking what institutional framework the United States economy needs to control the potential instabilities that are present in every modern financial system.

You may say this is all a waste of time, that they are not going to listen to us. My experience with plans for dealing with future eventualities is, you never get it right. You never have written a plan that is just exactly ready to be taken off the shelf and put into practice. But the fact that you did that exercise and asked the questions about how you are going to deal with a variety of plans means that you will deal much better with the next crisis when it comes than if you had just left events to take their course. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Mester.

MS. MESTER. Thank you, Madam Chair. First, I, too, want to thank the authors and the project managers for preparing such a solid set of memos and briefings. I found them very helpful, and they give us a lot of food for thought. As the memos articulate, there are a lot of interdependencies between the financial system and the real economy. Moreover, the research

and modeling that helps guide our thinking about these interconnections is still being developed. But the world waits for no one, and it won't wait for policymakers, so we need to come to some decisions about how we would proceed, in view of our responsibilities for ensuring our dual-mandate monetary policy goals and for promoting financial stability. I view today's discussion as a first step toward that.

I would like to suggest that the Committee set itself the goal of working toward a statement articulating the way it will consider financial stability in the context of our statutory responsibilities. We know from hard experience that getting the needed consensus among participants to produce such a statement can be difficult to achieve. But even if we end up not publishing something, either as part of our longer-run monetary policy strategy statement or separately, I think working toward such a goal will help drive us to some conclusions.

Now, rather than answer the specific questions posed in the staff memo, which I guess, according to President Evans and Governor Tarullo, means I am not a rookie, I am going to make five broad points.

Point one, the FOMC cares about financial stability to the extent it affects the health of the real economy. Minor disruptions or volatility in financial markets that represent the ebb and flow of a dynamic economy but do not threaten the health of the economy are not something the FOMC should respond to. In general, the goals of monetary policy and financial stability are complementary, just like the two goals of our monetary policy dual mandate. In this, I agree with Governor Tarullo. However, at times, actions that could be taken to foster financial stability might be in conflict, at least in the short run, with those taken that promote our monetary policy goals, and we need to consider the tradeoffs. In the United Kingdom, the Financial Services Act recognizes this potential tradeoff and explicitly says that the Financial Policy

Committee is not authorized to act in a way that it feels is "likely to have a significant adverse effect on the capacity of the financial sector to contribute to the growth of the U.K. economy in the medium or long term."

Point two, our experience from the recent financial crisis underscored the importance of creating and maintaining a resilient financial system, one that lowers the probability of instability and that limits the damage when financial shocks arise. The first memo discusses some of the tools that can be used, including higher capital requirements and liquidity requirements. Living wills and a credible method for resolving failed institutions are very important tools for eliminating moral hazard, and work is being done to implement many of these types of resiliency tools.

Point three, incentives matter in all of this—the incentives of the financial institutions, but also the incentives of regulators and policymakers. There are considerable time inconsistency problems here. To the extent possible, policymakers should take a systematic approach in applying financial stability policy rather than rely on discretion. We can issue guidance, but if we aren't willing to aggressively support it, then it becomes less effective. The benefit of a systematic approach wasn't covered in the memos, but it is related to the distinction between the static and cyclical macroprudential tools. Static through-the-cycle tools promote resiliency because they are known and permanent. But the cyclical macroprudential tools can be made systematic by laying out in advance the contingencies in which they would be invoked. For example, we can write down a formula for a countercyclical capital buffer, and we can define an explicit trigger for contingent convertible bonds.

Point four, any macroprudential action, whether it be by the FOMC or by another authority, must be communicated in a clear way to avoid creating a conflict with or causing

confusion over actions taken to foster our monetary policy goals. Careful thought should be given to the types of communications that we should use.

Point five, following my reading of the literature and the memos, I think our first line of defense should be the macroprudential tools that are focused on increasing the resiliency of the financial system. Capital liquidity, living wills, resolution—these are the structural tools.

I believe the important work that Governor Tarullo and the staff are doing to implement Dodd-Frank is consistent with this. I'm less convinced that we have enough knowledge and experience with the countercyclical tools to use them effectively at this point, but I think they are worth further study. The complications of the financial system in the United States, including multiple regulators, does need to be considered, as they limit the speed with which certain tools can be wielded and potentially limit their coverage. Taking an action that pushes risk away from one set of institutions to another doesn't eliminate the risk. It just lets it move around, potentially to a part of the financial system in which the risk is more difficult to monitor and to control.

These considerations lead me to think that we should set the standards and the resiliency tools a tad higher than they would be if we had more confidence in the other tools and our ability to use them effectively. It also leads me to believe that while I'd want to rely on the financial system's structural resiliency tools first, and perhaps some of the cyclical macroprudential tools, to the extent they'd be effective, in a situation in which these tools prove to be inadequate and risks to financial instability continued to grow and spread more broadly throughout the financial system, monetary policy should be on the table as a possible defense. I note, however, that in this case, the blurring between financial stability goals and monetary policy goals would be high. If we assess the risks of the financial instability to be great, achieving our dual-mandate goals

would be in jeopardy as well. And this is an illustration that, in most cases, the goals of price stability, maximum employment, and financial stability are complementary. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Williams.

MR. WILLIAMS. Thank you, Madam Chair. First, I'd like to lodge a complaint about Brian Madigan. I asked to go early, but he put me after the last four speakers, who have said everything that I think needs to be said and said it very clearly. So here we go with my somewhat uncertain view on many of these subjects, some of which have already been characterized—or should I say, "caricatured."

The staff memos and presentations help frame the many issues related to monetary policy and financial stability. They point out that, ideally, macroprudential tools should be the first line of defense for financial stability. But, unfortunately, as table 1 in the first briefing makes clear, these tools are hard to find in the United States. It's one of these cases in which economists assume a can opener, and the problem is solved.

The reality is that nearly all of our tools are microprudential in nature. In the U.S. context, when I think about macroprudential, it's LTVs and things like that. In the United States, it's really about how do we take a macroprudential perspective kind of approach when thinking about the use of our microprudential tools. My favorite example is CCAR, the stress test, because these tests can and have been designed to penalize activities that are viewed to be a financial stability concern. Basically, you put into the severe adverse scenario things that you're worried about. You could think about doing this back in 2003. If we had that tool, you would put a housing bubble in, and then that clearly would penalize institutions that have a lot of exposure to that, creating a "shadow" cost to doing that and, we would hope, creating an

incentive to have less exposure to that. Obviously, countercyclical capital buffers are a tool down the road that could have a macroprudential aspect.

Now, there is no question to my mind that the improvement in our microprudential tools have created a much more resilient financial system today. But there are practical limits to mitigating macroprudential concerns using microprudential tools on banks. And I think, more importantly—and this was already mentioned—our tools have significant gaps in coverage. It's a poor carpenter who blames his or her tools, but when it comes to macroprudential policy, the shortage of tools does limit our policy choices.

Just because we have the shortcomings of a macroprudential toolbox, that doesn't argue for the systematic use of monetary policy to address credit or asset price imbalances. Of course, we can't and don't ignore financial stability concerns or financial market conditions in making monetary policy. And, in particular, as highlighted by Tobias Adrian's presentation and the paper, we need to take into account the possibility that monetary policy actions do contribute to imbalances that threaten financial stability and ultimately undermine the achievement of our mandated goals. In this regard, I do think something that Tobias Adrian said is important. You have to think of this as situation dependent. You can't just have a general rule saying, "Should monetary policy lean against imbalances?" I do think it matters what the situation is, so let me give you a little bit more on that.

There is considerable uncertainty about the drivers of imbalances and effects of monetary policy. So one concern—and this was brought up a few times, specifically by Governor Fischer—is the potential for a very high cost of trying to burst the house price bubble or some other bubble that's already become a huge concern. The work that was done by Jorda, Shularick, and Taylor, which was cited in the staff briefing, does suggest that trying to pop a huge bubble

could be very high. Just to put some numbers to that, if monetary policy had tried to offset the run-up in the house-price-to-rent ratio that peaked in 2006—again, thinking about it, you've already got this bubble—their empirical estimates indicate that real GDP would have to decline by 12 percent. Now, you can debate the specific numbers or their analysis, but the results still suggest that these are significant costs and roughly twice the peak-to-trough decline in real GDP per capita that we saw in the Great Recession.

Everyone has talked about Sweden's experience as well, and I think that the situation there is relevant and illustrates some of the challenges when you are basically trading off macroeconomic goals with financial stability or credit imbalance concerns. They have high unemployment and very low inflation, and tightening monetary policy in that situation moved inflation further from their target. And that does bring up this risk, which has already been mentioned, that fighting financial imbalances could undermine the credibility of the central bank in achieving its mandate goals. There is a risk that tightening monetary policy when inflation is persistently running below target undermines confidence in the central bank's commitment to that target. We actually saw some evidence on that, both in Sweden and Norway. Both of those central banks did highlight in their public statements the fact that they were using monetary policy to address financial stability concerns at the cost of their inflation and other goals, and we did see, at least in some surveys, a decline in longer-run inflation expectations while they did that. Since then, they have backed off that, and we have seen inflation expectations move back some, but it causes me to worry about some of the longer-term costs associated with the nominal anchor.

Now, on the basis of the analysis and the evidence, my own view at this stage, recognizing all of the uncertainty and all of the work that still needs to be done on this, is that the

primary line of defense is microprudential. It's about capital, it's about liquidity, it's about strong supervision of our deposit-oriented institutions and, we hope, a financial system, as well as we can. I think that should be complemented increasingly by macroprudential approaches, such as with CCAR and other tools that we do have, that even if they are microprudential by design, they can be implemented with more of a macroprudential perspective.

In thinking about monetary policy, I am drawn to the Hippocratic Oath of doing no harm. Our primary focus should remain on our dual-mandate goals. We know from the history of central banking that when you lose focus on price stability, that has very significant costs to society. But assuming that we are in the vicinity of our goals, we should take care that monetary policy does not inadvertently contribute to fostering the emergence of imbalances in the economy, because the cost of trying to use monetary policy to tame imbalances after the fact are simply too large.

Early on in my career, I had to write down what my area of research was. Mine was monetary policy under uncertainty. I always thought that was a good choice for research. I think this area is one in which we really are very uncertain about how our tools affect the economy, and I would go back to President Mester's point that, in view of the uncertainty, the argument I would make is that we want to have as robust and resilient a financial system as we can without having to really think that monetary policy is going to be the thing that saves us in the end. Thank you.

CHAIR YELLEN. Thank you. President Harker.

MR. HARKER. Thank you, Madam Chair. I'd also like to thank the staff for some excellent work. I agree with much of what has been already said. I'll keep my remarks short.

First and foremost, I don't think financial stability concerns should be elevated to the level of a third pillar of the monetary policy mandate. I share the view of the memos that systemically setting our policy instrument in reaction to financial indicators requires knowledge we don't yet have, and the economic costs most likely outweigh any potential benefits. Those economic costs, as stated before, could be fairly large, because it would likely take a very significant change of policy to reduce credit and asset prices. Also, as we know, all run-ups in asset prices do not necessarily signal that something is amiss. So it's very possible that we could make systemic mistakes when trying to regularly employ policy toward affecting asset prices. Basically, I am skeptical that we can navigate a stability-growth frontier in a reliable manner. That said, and as others have said, there may indeed be instances when the Committee is fairly confident that it can identify financial imbalances. In those cases, a monetary policy response may be warranted, but I believe such cases would be infrequent and should be handled on a case-by-case basis.

Macroprudential policy should be our tool of choice, especially when considering systemic risk. I believe our current expansion of regulatory powers has made the banking system more resilient. And should new risky behavior ensue, we have the abilities in this sphere, albeit imperfect, to avert it. A recent case in point is the March 2013 guidance to curb risky lending in the leveraged loan market. It is true that it took some time for leveraged loans to begin contracting in 2014, but it appears that macroprudential intervention was an important element in changing behavior. But just because regulatory interventions do not work instantaneously, that should not be used as a rationale for substituting monetary policy, because monetary policy is unlikely to result in instantaneous responses either. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Brainard.

MS. BRAINARD. Thank you very much, Madam Chair. The discussion so far has been really excellent, and the papers prepared to inform us were quite excellent as well. I think the discussion is timely. If, as current research suggests, we're in a world in which the equilibrium rate of interest is depressed for a prolonged period of time, these kinds of tradeoffs between the setting of monetary policy appropriate for achieving full employment and our inflation target and the risks of financial imbalances associated with a so-called risk channel of monetary policy are likely to be more common. In fact, we are seeing that in some foreign economies.

I think there are a few conclusions that these papers suggest, as do external research and close observation of several foreign jurisdictions. The research does support the reality that we're observing, which is that there can be an important effect on monetary policy through changes in risk premiums and risk-taking in financial markets and, of course, beyond.

It's difficult enough, though, to get monetary policy settings just right for the specific inflation and employment objectives that we operate under. If we further burden our single policy instrument, powerful as it is, with a third objective related to credit intermediation, our challenge will become even more complicated. The conclusion of some of the research in this area hints at the complexity as it suggests that the efficacy of such an expanded objective function will depend on the source of the shock, which is likely to be unobservable. And, of course, several people have mentioned the work by Lars Svensson that just points out that, under many conditions, the benefits arising from adjusting monetary policy to address credit growth are likely to be outweighed by the greater cost in terms of higher unemployment and lower inflation, which magnifies the cost of a possible crisis. On the other hand, I think the research that was presented today does raise some important questions, and I hope that we will return to this because the research agenda is highly dynamic. It leads me, though, to the same conclusion that

many have drawn, that it is highly desirable to have time-varying, sector-specific macroprudential tools that operate more directly on the incentives of firms and households to take on excessive leverage in particular asset classes. That bring us squarely to consideration of our own institutional environment and the adequacy of our authorities in this regard.

To start, I think it's worth pointing out that we are in a much better position than we were pre-crisis in terms of the authorities that we have and the rigor with which we are exercising them, and, in fact, there have been very important structural innovations. The Committee on Financial Stability has been created here at the Board with overlapping membership with the Committee on Bank Supervision, and of course overlapping membership with the monetary policy committee, the FOMC. More broadly, because regulatory authorities in the United States are fragmented, the Financial Stability Oversight Council has brought all of those regulatory authorities together for the first time. We have and are exercising a greatly expanded set of both micro and macroprudential tools that have greatly increased the structural resilience of the banking institutions that are at the core of our system. We have implemented greatly enhanced requirements that have resulted in much more and higher-quality capital throughout the banking system, and we've put in place on top of that a set of very stringent macroprudential capital and liquidity requirements that are tailored to the systemic footprint of the largest firms.

Of course, these are through-the-cycle safeguards, meaning that they impose structurally higher standards that are better suited to building resilience than to leaning against the buildup of risks. In fact, because of the institutional environment we sit in, we probably put greater emphasis and build even greater resilience than we would if we had a very complete set of macroprudential tools. They are generally cumbersome to tailor to sector-specific risks. Beyond this, our capital and liquidity stress tests provide critical capabilities to tailor scenarios in each

annual cycle to ensure that the largest institutions have capital buffers that are relatively robust to specific risks that we may see building, for instance, on CRE or on leveraged lending. In addition, when the risks of financial stability increase overall, the Board, in consultation with other banking regulators, will temporarily increase the amount of capital that the large banks are required to hold in order to build resilience and to restrain undue risk-taking on a cyclical basis. This does ensure that we will systematically and routinely have to consider a quantitative and qualitative set of indicators and vote on whether to impose those buffers. This is important, I think, as a signaling device, and it puts a lot of responsibility on us, which is new. Of course, on the other hand, it is slow to implement and, again, not sector-specific.

So all of those things, I think, should give us some confidence that we do have a set of additional tools. Nonetheless, I remain uneasy for the specific risk that we've highlighted here with regard to housing bubbles in particular—which appear, historically, to be the most deeply damaging sources of periodic financial crises. Given our current authorities, the banking agencies could, perhaps, impose higher risk rates on mortgage loans with particular characteristics either directly or through expectations for the stress test, but it would require upwards of a year to adjust. Moreover, as others have noted, it would be narrow in its scope of application, because a large share of mortgage lending is undertaken by nonbanks, and it may prove ineffective at times when bank regulatory capital comfortably exceeds the required thresholds.

In this arena, our authorities fall short of other jurisdictions that have deployed time-varying, sector-specific macroprudential policies to cool their housing bubbles. We noted earlier that financial authorities in the United Kingdom, Sweden, Switzerland, and New Zealand, among others, have confronted rapidly rising residential housing prices in precisely the kinds of

environments when there were compelling reasons not to use the policy rate as the first line of defense. Many responded by tightening restrictions on borrowing through loan-to-value or debt-to-income caps—in some cases, in concert with disincentives for lenders, and in many cases, in an escalating pattern. And, indeed, the research that the IMF has undertaken, among others, has shown that macroprudential measures imposed directly on borrowers can have greater and more immediate efficacy than restraints imposed on lending.

In our environment, responsibilities for financial stability, on the one hand, are largely separated from those for consumer credit protection, which the CFPB does have across both banks and nonbank lenders, for instance, through imposing LTV caps through their QM rules. So these authorities exist, but they are fragmented. In order to get agreement across regulators, it may take an unduly slow and cumbersome process working through the FSOC. That should give us some pause. Under these circumstances, as I think others have also concluded, monetary policy might, by default, carry a greater burden as a second line of defense.

All of that said, I think the research that we should be undertaking should include not just the possible tradeoffs involved in using monetary policy to address the buildup of risks in the credit system, but also contemplate the authorities that we have and do not have and the tradeoffs in the possible setting of those authorities. Again, in circumstances in which we have more authorities to build structural resilience, there may be tradeoffs at keeping those settings higher through the cycle as compensation for not having a full set of macroprudential authorities. And it's something that I think we would benefit from specific research on. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Lockhart.

MR. LOCKHART. Thank you, Madam Chair. I, too, want to thank the staff members who participated in teeing up this conversation. Before wading into this topic by reading the materials, I had some general predispositions on the issues highlighted in the memos. My views going in were, first, that the use of monetary policy tools ought not to be the preferred approach to addressing a buildup in financial stability risks; second, that continuing refinement and implementation of macroprudential tools and programs, although imperfect in a number of dimensions and no guarantee that tail risk will be avoided, still represent the best practical alternative; third, that a resilience-oriented policy and supervision focus will likely have a greater payoff than an emphasis on prevention; and, finally, that sharply raising the policy rate or initiating sizable asset sales in an attempt to prick an asset bubble or to discourage credit expansion and growing leverage or to discourage types of risk-taking or even to correct a perceived economic imbalance is likely to entail undesirable, even unacceptable, costs and consequences.

Those were my views before thinking about this. The staff memos did not really move me much fromthose views, although the discussion this morning may do so. My thinking actually kind of fits Governor Tarullo's caricature of most monetary policymakers. But the memos did serve to deepen my understanding of the challenges and uncertainties involved.

I understand today's session to be largely a high-level discussion asking for an initial response. I'll just make a few comments in response to the questions posed. Are macroprudential tools enough "most of the time?" Yes, I think macroprudential tools should be sufficient, and by that I mean more advisable as a first resort in most circumstances. And "most circumstances" in my mind, in my imagination, are likely to be ambiguous and not clearly far advanced. That said, I don't think mobilization of monetary policy tools should be ruled out, if

only because we can't anticipate all circumstances. On the question of any distinction between tools through-the-cycle or structural tools versus tools for cyclical buildups of risks, I start with an opinion that risk-taking accretes over time with sustained benign conditions. Said differently, our policy success sows the seeds of financial instability. And this suggests to me that systemic risk vigilance probably should be pro-cyclical and the application of macroprudential tools, at least for cyclical purposes, may have to be time variant. As I said earlier, I see macroprudential tools that promote resilience as an important complement. Do the dispersion and fragmentation of regulatory responsibility and the attendant coordination challenges affect my views of macroprudential tools? Yes, this reality reduces the probability of effective action. Unfortunately, this is not a problem likely to be remedied in the foreseeable future. It's a problem I simply think has to be worked on as best we can. And it goes without saying that the Federal Reserve still holds powerful cards in formulating macroprudential policy and its implementation.

Would I support using monetary policy tools for financial stability purposes if the dual-mandate objectives had to be subordinated—this is the way I understood the question—and, if so, under what conditions and how likely are they? My view is, only in very extreme circumstances. If the Committee had full or very high conviction that the risks of severe financial instability were approaching an untenable state, I could imagine tolerating some higher unemployment or deviation from our inflation target for a time in the interest of avoiding a much more costly development. In these rare cases, using monetary policy to promote financial stability would be consistent with, not contrary to, achieving the dual mandate over the medium-term horizon. What constitutes an untenable state is subjective but could be informed, I believe, by comparisons with earlier episodes of incipient instability; attention to quantifiable

benchmarks for debt buildup and aggregate leverage, for example; and, possibly, recognition of widespread unsound practices and behavior. Nonetheless, the existence of a sizable, evolving, and opaque shadow banking system in this country makes arriving at such judgments extremely challenging. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Evans.

MR. EVANS. Thank you, Madam Chair. Thanks to the presenters and their colleagues for providing a collection of insightful memos on a particularly challenging topic. And the discussion this morning has been fascinating. I'm apparently going to change my normal behavior today. I'm going to largely frame my remarks around a couple of the explicit questions that were suggested to us. [Laughter]

Question 2a asks about our support for using monetary policy "to pursue financial stability goals." In some cases, such as in the depth of the financial crisis, the policy settings to achieve monetary and financial stability goals are complementary, and there is no policy dilemma. But I am extremely skeptical about using monetary policy to support financial stability goals in situations when doing so would in any way counter or degrade the FOMC's attainment of our maximum-employment and price-stability goals. Importantly, if this dilemma arose, I expect we would need to make large increases in our policy rate to have a meaningful effect on financial instability risks. I think the briefings were fairly clear on that. The recent experiences of Sweden and Norway suggest that moderate tightening has pretty limited effects. Such large rate increases likely would have large and deleterious consequences for output, employment, and inflation.

If our only option to mitigate financial instability risks were a very large monetary policy action, this would be evidence of a substantial flaw in our regulatory regime. The U.S. economy

ought to have adequate resiliency in the financial system so that this Committee does not face that choice. If we had to take such an action, I think it would be a huge credibility problem for the Federal Reserve. We'd be raising the funds rate at a time when that action presumably would lead to higher unemployment and lower inflation, and—presumably, because it's a dilemma—that would be the wrong direction to go. The public would lose confidence in our abilities, both as monetary policymakers and as financial regulators. The aftermath of such an event would include, I expect, a serious postmortem. It is critical that this Committee has substantial confidence that the Board and other regulatory bodies have the appropriate tools to address risks to financial stability, and that these tools will be deployed with the appropriate timing and vigor.

I found Governor Tarullo's comments particularly provocative and interesting when he mentioned that monetary policy might have to consider weighing in periodically, or he at least asked a question about that. I have a former colleague, Pedro Teles, who's now at the Bank of Portugal, and he is a theoretical economist. He studied models in which he basically inserted marginal tax rates all around the economy on consumers, on businesses, and things like this. Well, these taxes are additional instruments, and he could make the entire model dance and overcome distortions and achieve first-best allocations. That's what can happen if you have enough instruments to pursue what you want. The question is, why not fiscal policy? Why not something like that? We talk about macroprudential tools, but fiscal policy or the structure of the economy could also do it. Well, it's because we just assume that it can't be done, that the fiscal authorities can't decide on things like that. It's a presumption that monetary policy can be bent to address these issues. But that's broadening our goals. If we're going to do that, we really should have a very serious discussion about it. That's how, in many cases in the past, in different contexts completely, we've gotten ourselves into trouble. Take the 1970s when we

were trying to get the economy going because we thought it wasn't going fast enough, and we ended up with a lot of inflation. I agree very much with Governor Fischer's comments about how you need the same number of instruments as goals.

Circling back some, question one asks our opinion of the adequacy of the current macroprudential toolkit. Well, maybe I'm naïve, but I am relatively optimistic that our post-Dodd-Frank regulatory efforts are building greater resiliency into the financial system. That said, as these memos highlight, significant challenges remain. I was sympathetic to the memo's discussion of how difficult it is to identify risks and respond in a timely fashion with regulatory tools. Accordingly, as others have mentioned, tools that are either explicitly or realistically through-the-cycle seem most promising to me in this regard. The strong role played by enhanced capital requirements in our current regulatory approaches is an excellent step forward. Regular stress testing is another strong tool. Regular stress tests help build confidence in banks' resiliency, may uncover previously underappreciated risks, and can enhance a baseline discipline that would prove useful in addressing some unforeseen stress in the future. And resolution planning is beginning to seem promising. When I hear that Citi garnered only shortcomings and not deficiencies, that sounds like real progress to me. Now, all of that is in the public domain, right?

I fully appreciate that these are extremely difficult regulatory issues, and some risks will always remain. And I will readily admit that I'm not an expert. But I am listening carefully to these experts' views, and I hope they will continue to be shared with the Committee to build further confidence that financial-stability risks will not intrude on monetary policy implementation except in the normal monitoring-the-effects role, which we always do.

My notes say "finally," but I probably have a couple more comments after this. [Laughter] Finally, as the Fuhrer, Haubrich, and Peek memo discusses, it's reasonable to ask whether it's a good idea to separate monetary policy authority from financial-stability responsibilities. The feasibility of effective separation depends on the structure of the economy and the financial system. Some scholars have studied economic environments in which the authorities have enough policy instruments to approach these objectives separately. But other environments exhibit too much interdependence so that economic distortions emanating from the real side and from the financial side cannot be fully separated and controlled without more tools and authorities, which are currently absent. Again, that's Governor Fischer's point. In these environments, more coordination between monetary and financial regulatory authorities would be required. So even though the Committee and the Board have distinct statutory responsibilities when it comes to monetary and financial stability objectives, we should continue to build a joint understanding of the effectiveness of all policies for dealing with any emerging risks that could threaten our best approach to setting monetary policy.

Now, I believe that Governor Tarullo offered up a suggestion to the Committee on Financial Stability on a to-do list to look at the early 2000s period. I think that's appropriate. I would also suggest looking at the 2013 "taper tantrum," because in one of the sections of Ben Bernanke's book in which I found new information, not things I already knew, was his description of the taper tantrum and the events that led him to make certain comments. It seemed to me that he was perhaps highlighting concerns in Washington that I had not felt were represented well in our March 2013 discussion on financial stability. I walked away from the Committee discussions thinking that we were all pretty comfortable with not adjusting our

approach on the basis of financial stability. But in his book, he suggested things a little bit differently. Anyway, I think the taper tantrum is one thing to look at.

Okay, finally, if we decide that financial instability risks, when things are really brewing in large, will trump achieving our dual-mandate responsibilities with monetary policy, then I've got to be concerned that our inflation objective is almost surely too low, because that would be a circumstance in which we would need to create a contractionary monetary policy that would drive inflation below our 2 percent objective. I don't think that's anything that we've contemplated in the setting of this inflation objective. And it would at least be fair game, if we were going to go that route, to reconsider that. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Bullard.

MR. BULLARD. Thank you, Madam Chair. I thank the staff for an excellent set of memos on this important topic. I regard this as the issue of our times, and I have reviewed the memos in some detail with my staff. My main conclusion is that the state of thinking on macroeconomics and financial stability interlinkages remains in flux, perhaps not surprisingly. And I would think it will be some considerable time before professional consensus forms on these issues. In the meantime, this Committee must make monetary policy decisions in the absence of professional consensus.

I have five main comments, which I'll list here and then comment on each of them. Number one, I'll talk a little bit about how many elements of the conventional wisdom on this issue do not ring true to me, and this will echo some of Governor Tarullo's earlier comments. Number two, this set of memos has a glaring omission: a type of theory that receives substantial attention in the research literature but zero attention in policy circles. So I'll talk about that. Number three, my reading of the empirical evidence presented is that it is broadly consistent with

ideas that suggest monetary policy may intersect importantly with financial stability. Number four, the theory literature is extremely clear that, under appropriate assumptions, financial stability would be an important concern for monetary policymakers, and the caveats to this are unconvincing. And, number five, the international experience suggests that, although some foreign economies have experimented with macroprudential policies, it is far from clear that sufficient macroeconomic policy tools exist in the United States to maintain satisfactory financial stability in the absence of monetary policy adjustment. So let me comment on each of these points.

First of all, many elements of the conventional wisdom do not ring true. I interpreted the Fuhrer, Haubrich, and Peek memo as characterizing portions of the conventional wisdom on this topic. Aspects of the conventional wisdom include: (a) Do not freight monetary policy with too many conflicting goals. This is commonly said. In my view, multiple goals can be perfectly fine. Monetary policy in the United States famously has a dual mandate. The entire purpose of preventing a financial crisis is to prevent the effect on the dual-mandate goals. Unemployment spiked to 10 percent following the financial crisis. Surely this is worth preventing by any means, including monetary policy, if necessary. I agree totally with President Evans's comments on many tools. It would be nice to have many tools available. And in models, if you have a lot of tools available, you can do a lot of things. The whole point of the discussion is that this is a second-best world. Also, multiple goals can always be reconciled through an appropriate specification of an objective function.

Another part of the conventional wisdom is: (b) It may be difficult to identify emerging instability risks early enough. This is something that's commonly said. I don't think this is right, either. Both the tech bubble and the housing bubble were readily apparently to all

observers and were hotly debated, even around this table, as they were occurring. It wasn't a matter that we didn't know that the bubble was upon us. The idea was, we didn't know what, if anything, to do about it. So, in my view, the idea that these problems sneak up on us does not ring true.

A third part of the conventional wisdom is: (c) The effects of monetary policy on asset prices and credit growth during a bubble are uncertain. This also doesn't ring true as a reason for refraining from taking action. The effects of monetary policy are always uncertain. The effect of monetary policy is certainly to mitigate the bubble. It's just a question of the magnitude of that effect. By using monetary policy, one may be preventing a disaster like the one that unfolded from 2007 to 2009.

And part (d) of the conventional wisdom is that significant collateral damage may arise from using monetary policy tools to address financial instability. This line of thinking, which has been echoed around the table here, has the flavor that you're going to make a policy mistake. If you make a policy mistake, yes, there's going to be a lot of collateral damage. The question is, is there an optimal monetary policy that would work that would take care of financial stability? So we're talking not about policy mistakes, which are always a risk; we're trying to talk about an appropriate application of monetary policy. An appropriate application of monetary policy in a bubble situation holds the promise of a smoother growth path for the economy as opposed to one that is characterized by a boom-and-bust cycle. In sum, I think much of the conventional wisdom summarized in this memo is questionable.

My second comment is, there's a large gap in the coverage of these memos compared with the research literature. There is a large literature on the multiplicity of equilibria and the possible contribution of monetary policy to creating and sustaining that multiplicity. Many of

the exotic equilibria that exist in models feature substantial economic volatility—exactly the sort of boom-and-bust phenomenon that the literature on financial stability is attempting to explain. The “extra” equilibria, which often exist, may seem exotic or special in some sense, but they are fully consistent with rational expectations and market clearing—and so are at least as legitimate as the other equilibriums that we rely on to inform monetary policy choices. As an example, even in the very simplest New Keynesian model, which ultimately informs much of the analysis presented to this Committee, an interest rate peg is associated with a fundamental equilibrium, which is the one we often use for policy analysis, but also with many volatile equilibria, which could be thought of as implying boom-and-bust cycles. See, for instance, Jordi Galí in his basic book explaining the New Keynesian model.

Furthermore, appropriate policy could easily eliminate these boom-and-bust cycles, and so monetary choices in this kind of thinking would have an enormous effect on whether you’re going to get financial crises of the kind that we think we’ve observed in the United States recently. My point would be, policy rules can help define the equilibriums that are even possible in the economy. And in this sense, good monetary policy could put you on a path on which you wouldn’t experience any of the deleterious equilibrium effects that you think we’ve experienced in the past few years. If you don’t believe me on this, just think about Diamond-Dybvig. A lot of you know Diamond-Dybvig models of bank runs. That’s a multiple-equilibrium model. There’s a normal equilibrium, in which people deposit in the banks and everything goes fine. There’s a run equilibrium, in which everybody runs on the bank. The run equilibrium is bad. In that model, you put in deposit insurance, it eliminates the run equilibrium, and everything works fine forever.

That's a model in which policy has an enormous effect on the kinds of things that can happen in that particular economy. The same kinds of things are true in the New Keynesian economy. And I think it'd be worth thinking a little bit more about these kinds of issues before saying that monetary policy can't do anything about bubbles or asset price volatility. This is an example of a conception of financial volatility that has considerable support in the literature but is not represented in the span of this discussion. I think the omission of this area of research is inappropriate for discussion at the level of this Committee, which purports to provide a review of current thinking on macroeconomics, monetary policy, and financial stability.

My third comment is on the memo by Adrian and others, which was on empirical evidence. I just have a brief comment. The empirical evidence seems to run counter to some of the conventional wisdom on the subject I was reviewing earlier. In particular, the empirical results seem to confirm the intuition that monetary policy has an important effect on risk-taking in the economy. And so I found these results quite interesting. I'd encourage more work in this area.

My fourth comment is on the Durdu and others memo. The theoretical literature is extremely clear that, under appropriate assumptions, financial stability would be an important concern to monetary policymakers, and the caveats to this view are unconvincing. What does the theoretical literature say that is so compelling? It's a simple argument. The basic friction that motivates monetary policy in leading models is sticky prices. This means, if taken seriously, that observed prices across a variety of markets do not represent true market-clearing prices. This motivates monetary policy intervention to help the inappropriate pricing going on in the economy. But this is in the context of perfectly operating credit markets. If one assumes an additional friction analogous to sticky prices that also causes credit markets to work imperfectly,

then an appropriate monetary policy will want to take this friction into account as well. Furthermore, it's unlikely in the general equilibrium that you're going to be able to separate the reaction to these two frictions. Because many economists—and, I believe, many of you—think that there are tangible frictions in actual credit markets, this argument strikes me as extremely powerful, independent of exactly which model one wants to talk about in this area. This would say, if you're designing an optimal monetary policy and you think there's sticky-price friction and you think there are things going wrong in credit markets, then you're going to want to take into account both of these frictions when you're making your monetary policy. The caveats to the argument struck me as rather weak, as they concede this theoretical point and start arguing about other matters.

And, finally, my fifth comment is on the international experience. The memo on this topic showed that some foreign economies have experimented with macroprudential policies. The U.S. financial system is far deeper, broader, and more complex than the financial systems in many of these countries, and on this I agree with Governor Fischer's and President Williams's comments and those of many others. It's far from clear to me that sufficient macroprudential tools exist as of today in the United States to ensure financial stability through this channel alone in the absence of monetary policy adjustment. For this reason, I think that it will likely be necessary to consider the use of macroprudential policy in conjunction with interest rate policy in order to maintain financial stability in the United States. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Lacker.

MR. LACKER. Thank you, Madam Chair. Because I might be one of the last speakers between you folks and lunch, I'll be brief. I construed the discussion topic as the narrow question of the way in which the setting of monetary policy instruments should vary with the

financial stability considerations, or observations of conditions, rather than the broader question of appropriate public policy in relation to financial stability. I agree that the state of understanding is relatively limited, and so my comments are basically two suggestions for further research.

The staff's focus is almost entirely on the buildup, or boom, phase, in which financial conditions are evolving in a way that might lead to future distress. I agree with the staff's memo that highlighted the difficulty of determining whether some observed developments represent inefficient departures from healthy market functioning. I agree, therefore, that humility should be our watchword. For me, this is a powerful argument for central banks to stick to their price-stability knitting, because responding to sectoral developments per se runs the risk of entangling us in distributional politics. Besides, the economic basis for doing so seems not obvious to me in many circumstances.

For me, this is also a powerful argument for more research on how we should know, in real time, what the appropriate response should be. And here I guess I differ from President Bullard about what we knew in 2005 or 2006. Maybe there was agreement on overvaluation of housing, but exactly how that would play out and exactly how different approaches to monetary policy would affect that were, I think, quite uncertain. And I contrast this kind of research on how we should know with what I see as the bulk of research that has been cited for us, in which the policymaker is absolutely sure of the model he's in: He's in the model that the modeler wrote down. As a result, it's just a matter of deciding what to do about what he knows, as opposed to having to sort through different theories, different models, different estimates, and then different understandings of how to proceed.

In the other direction from leaning against booms, there appears to be little controversy that, as one paper put it, "monetary policy should be used to stabilize the economy and financial markets in the wake of a financial crash"—in other words, respond to a full-blown recession. But I'd like to suggest that there's a third case that deserves attention as well: instances in which financial market turbulence arises but does not end up leading to a full-fledged crash and thus ultimately proves transitory. Examples would include the stock market break of 1987 and the LTCM–Russian debt default crisis in 1998–99. It's natural at such times to make monetary policy more accommodative out of concern for the downside risks—that is, the increase in the probability of adverse outcomes for economic growth and inflation. And I view that as the standard monetary policy response to information about the prospects for the fundamental things we care about—employment and inflation—not an additional reaction to financial stability. But even if the financial market turbulence settles down without causing a recession, it's common at times like that for monetary policy to remain more accommodative for some time.

Clearly, though, it can't be optimal for the monetary policy reaction to be permanent in the sense that the policy rate path is forever deflected downward by a one-time ratchet effect in response to every instance of financial market tumult. Even short of a strictly permanent reaction, I believe what happened in 1998–99 illustrates that there's a very real risk that when monetary policy remains more accommodative for too long and sets off a response, it could leave us substantially "behind the curve." So I think this portion of the monetary policy reaction function to financial-stability considerations deserves attention from researchers as well. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President George.

MS. GEORGE. Thank you, Madam Chair. I, too, thank the staff and have found today's conversation useful in refining our expectations for the role of financial stability in policy decisions. I would just say, the tools we have available in the United States today strike me as the ones we inevitably come back to after crises, a matter of basic supervisory and financial concepts related to capital adequacy, risk diversification, and limits on interbank and market exposures. The challenge remains, I think, in gaining confidence that such tools are calibrated in a way that keeps up with the dynamic financial system as it innovates and evolves. And, of course, that confidence depends on understanding whether we can reliably detect the buildup of unhealthy financial pressures and then deploy the appropriate tool before it's too late. I think today's discussion suggests we probably should continue to talk more about that.

I would not draw stark distinctions between through-the-cycle risks and those that are more cyclical. Adequate capitalization, low-to-moderate leverage, appropriate risk-taking, and strong liquidity within a robust microprudential supervisory framework, I think, is a good foundation for fostering financial stability. And I think our stress-testing approaches have certainly strengthened that framework.

As it relates to the stance of monetary policy to pursue financial stability goals, the tabletop exercise led by President Rosengren's committee last year considered the role of monetary policy relative to financial stability goals. As I did then, I continue to think that monetary policy is the wrong tool for responding to financial imbalances, and that it is too broad an instrument to effectively incorporate a specific financial stability mandate. That said, the pursuit of other macroeconomic objectives cannot ignore the important influence of the stance of policy. And keeping rates low for long periods with an eye only toward achieving our dual

mandate over the medium term can facilitate conditions that encourage risk-taking or misallocations.

Policymakers certainly bear responsibility for carefully calibrating the cost and benefits of such policy settings. However, raising interest rates seems an extreme response to the possibility of an imbalance and risks slowing the entire economy in an attempt to address a specific segment. For this reason, I prefer to lean on more targeted tools, which coordinate with and complement monetary policy objectives. And I think it would be worthwhile for us to think about a plan that would respond to a future financial stability scenario. I like Governor Brainard's ideas about considering the tradeoffs that might be associated with that as we go forward with this thinking. Thank you.

CHAIR YELLEN. Thank you. President Kashkari.

MR. KASHKARI. Thank you, Madam Chair. I am generally in the camp that the costs of using monetary policy exceed the benefits. I don't want to say "never," but I think it's unlikely I'd find myself in a situation in which that'd be the tool I would be going toward first. A couple of people around the table have used the word "humility." I think that's probably the most important word to remind ourselves of in these types of situations.

You know, Governor Tarullo mentioned an exercise. We ran a similar exercise in Minneapolis in which I asked our staff, with the benefit of perfect hindsight, to tell me when the FOMC should have raised rates in the past 100 years to deal with a bubble. And we couldn't reach agreement, whether it was the Great Depression or the Great Recession or the tech bubble. If we couldn't reach agreement when having perfect hindsight, I'm skeptical that we're going to reach agreement on a go-forward basis. And I think about two examples. One is, since the crisis, we've all been laser-focused on financial-stability risks, and I don't know anybody who

saw the price of oil going from $150 per barrel to $30. That's a heck of an economic shock, and we all missed it. Now, I don't know if it was a bubble, and I don't know if monetary policy should have been deployed to do anything about it—probably not. But just that example says that while we were looking, we still missed it. That's how hard these things are to identify.

Then I go back to 2003. Where do bubbles come from? They come from widespread delusions. We all know that societies are prone to mass delusion. And I think the bubble we experienced in the 2000s was a housing bubble—that we believed home prices would only go up. It's so difficult for an individual regulator to stand up to the country and say, "Hey, you're all wrong. We know better. You're all wrong about where home prices are going." And it's even harder to then say that we're going to put the country in a recession, we feel so strongly about that. So I think that some of the other macroprudential tools, even if they're imperfect, could be more credible tools that we could reach for rather than saying, "We know better, and, as a result, we're going to put the whole country into a recession."

So I would like to see us further explore what tools we have available. One of the memos mentioned the idea of a shelf registration of certain policy tools. I know countercyclical capital buffers are an example of that. I would love to see us explore—I just don't know the answer—how much power there is in shelf-registering potential tools that we could use at a future date. I'd like to learn more about that.

And, finally, I also see the benefit of potentially using the bully pulpit. The hardest part about all of this is for us to have confidence that it really is a bubble, and that we really should do something about it. If we really had confidence that there was a bubble and we should do something about it, if we spoke out about it with enough conviction long enough, I think we

could have an effect on markets even if we don't have a specific policy instrument at our disposal. Thank you.

CHAIR YELLEN. Thank you. President Kaplan.

MR. KAPLAN. Thank you, Madam Chair. And thank you to the authors of these papers and the team that worked on this project.

When I think about financial stability, I tend to separate structural issues from cyclical issues, specifically cyclical excesses, such as market valuation, the level of risk-taking. And in thinking about structural issues, I try to focus on five in particular, and should note that we've made good progress on many of these. Number one, do we have enough capital adequacy in our financial institutions, both banks and large nonbanks? Number two, is there liquidity of capital in a stress scenario? That is, can a balance sheet be "monetized" to provide capital? I think our stress testing has gone a long way here.

The third one, which was extremely problematic in the last crisis, is the level of interconnectedness in the financial system. This is harder to track because usually counterparty transactions are netted. But we found in the last crisis that there were a significant number of counterparty transactions that caused a domino effect. By some estimates, there was as much as $80 to $90 trillion notional amount of CDS versus about $10 trillion of debt issued globally. AIG was obviously an example of a party that had a substantial number of counterparty transactions. We need to track this so that you don't have one weak institution potentially threatening others.

The fourth thing I watch is mismatches between asset liquidity and either duration or capital structure, which include redemption provisions. For example, recently we've talked more about these high-yield mutual funds, which have relatively illiquid assets but offer daily

liquidity. That's a good example of a structural issue that creates a financial instability. It may not be big enough to create a systemic risk, but I view that as a structural issue.

And the fifth issue that I try to track is the overall debt relative to GDP in the economy by sector: household sector, financial sector, nonfinancial businesses, and then the government. For example, what we found looking at the last crisis was that there was an extraordinarily high level of debt in the household sector relative to GDP, but it didn't look that significant because of asset values in the household sector, particularly home prices.

Those are the five things that I still think, even sitting here today, we should keep track of. It strikes me that, yes, all of these structural issues lend themselves to macroprudential tools as a first line of defense. But they also require regulation from other entities outside the Fed, plus fiscal oversight, and that, through the FSOC and others, requires good coordination among agencies.

As a second line of defense, I do believe that monetary policy does need to be cognizant of cyclical excesses. Cyclical excesses can be dangerous because they amplify or expose structural faults. And monetary policy, as a second line of defense, can certainly help damp some of these cyclical excesses.

I think we have made great progress in the United States through CCAR, stress tests, and all the good work that has been done to address many of these structural issues. But the last issue that I'll mention is that I'm conscious of the fact that many structural faults exist outside the United States in places like China, and those risks threaten to spill over to other countries. We saw some evidence of an episode of this during the first four months of this year, when you saw structural faults in China threaten to create some destabilization in the rest of the world. When that happened, I thought it was a very appropriate time for monetary policy to act, in this

case by not acting. And I think that helped cushion instability that was created from outside the United States. As we go forward, we need to keep in mind that some structural issues may be as likely to occur outside the United States, and we're going to find ourselves dealing with them without any, or very few, statutory tools. In that regard, I believe that we will have to consider monetary policy as a second line of defense. Thank you.

CHAIR YELLEN. Thank you. Governor Powell.

MR. POWELL. Thank you, Madam Chair. On these issues, I have for some time generally accepted the conventional wisdom that called for macroprudential tools as the primary line of defense and for monetary policy to be used rarely. But at the same time, I am quite uncomfortable with the implications of that recommendation and whether we really have an understanding of why that is the right approach. And part of that discomfort is just having been familiar with work by Jeremy Stein and many others, including some of you around the table, which calls those things into question for various reasons. I would say these excellent memos and today's discussion have, I hope, moved me closer to clarity, but certainly not all the way there.

As these papers and the wider literature illustrate, many of the fundamental questions concerning the relationship between monetary policy and financial stability remain unsettled. There's significant uncertainty about our ability to identify threats *ex ante* and how to think about the tradeoff between type I and type II errors. The effectiveness of our macroprudential tools is untested. It's not clear whether and under what circumstances monetary policy is likely to reduce threats to financial stability without imposing too high a cost. All of this suggests to me that, as President Mester suggested, the road to achieving an addition to the consensus

statement in which we were all agreeing on the relationship between monetary policy and macroprudential and financial stability could well be a long and challenging one.

Although I regard the question as somewhat unsettled, my working view is that regulation, including macroprudential policies, should be the primary line of defense against financial instability. In the United States, increasing the system's overall resiliency with through-the-cycle policies seems like our best available tool for addressing these risks. Higher capital ratios, larger holdings of liquid assets, and the near elimination of "runnable" bank debt have made the banking system and our overall financial system safer. If these measures had been in place before the financial crisis, I feel fairly sure that the consequences would have been much less severe.

The efficacy of time-varying tools remains questionable. CCAR could be used in a targeted and reasonably timely way if financial-stability risks pertain primarily to the banking system. But the interagency process is slow and will remain so, inadequately addressing problems even in cases in which there is direct authority to do so. I don't expect that to change. There are also important sectors of the financial system in which transparency and the reach of macroprudential tools are limited, and I don't expect that to change either.

All that said, some of the research comes very close to saying that monetary policy is simply the wrong tool and highly unlikely to ever play a constructive role in addressing threats to financial stability. And I am uncomfortable—like, it sounds, others around the table are—with categorical statements about what one will or will not do in a crisis. Several have noted that humility is an appropriate watchword here. I think Mike Tyson actually said it so much more colorfully when he noted that everyone has a plan until they get punched in the mouth. [Laughter] In unusual circumstances, therefore, I could be open to using monetary policy to

address financial stability threats. There would be an obvious tension between moving early before the evidence is clear and waiting too long for clarity. And, of course, the earlier the intervention, the less clear it would be that higher rates would actually reduce the already very low probability of a financial crisis.

Despite these challenges, though, there are two key features of the U.S. context that call for keeping one's mind open and that I don't think are adequately faced by the literature. First, as many have mentioned, the U.S. institutional setting is very challenging for macroprudential policy, with our unwieldy regulatory apparatus and vibrant shadow banking sector. Second, while this is not my baseline, it's plausible to me that rates will have to remain very low for a very long time to achieve stable prices and full employment, but that such low rates will drive excessive credit growth and create irresistible upward pressure on asset prices, including real estate prices. I'm thinking of a situation in which a broad range of asset prices are moving up well beyond what fundamentals would justify; where the other tools we have don't seem to be addressing the problem or have failed to do so; and where low interest rates are pushing up asset prices and driving credit to excessive levels, probably over many years, and thus are a principal cause of the threat. Recalling that we have had two major real estate blowups in the past 25 years, I would not rule out a policy of leaning against the wind in such a case as one tool among many. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Vice Chairman.

MR. DUDLEY. Thank you, Madam Chair. First, I want to thank the staff for their thoughtful memos. I thought that how you framed the discussion was great.

While I agree that macroprudential policy measures are the primary instruments through which policy "should," with quotes around it, promote financial stability, I view the institutional

constraints in the United States as making this very difficult to operationalize in practice. I think that the diffusion of responsibility among many different regulatory agencies and the differences in mandates across these agencies are very important constraints. In my own experience, a number of regulatory agencies do not seem to give much weight, if any, to broad financial stability objectives. In particular, they do not appear to place much emphasis on the effect of how the behavior of any particular firm generates externalities that affect other firms and the broader financial system. Thus, rules and regulations tend to have a microprudential focus and a consumer and investor protection focus rather than being oriented toward mitigating risks to the broader financial system.

There's also a meaningful coordination problem, which suggests that implementing macroprudential tools in a timely way would be very difficult to do in practice. Yes, we do have the FSOC. But the reality is that the individual agencies guard their prerogatives, and the fact that the FSOC is chaired by the Secretary of the Treasury—part of the executive branch—can introduce a political element in the pursuit of its responsibilities. So under the U.S. institutional setup, I think tools that work automatically through-the-cycle might be more effective than those that would have to be implemented on a more discretionary basis. But such automatic tools are difficult to design and calibrate in a world in which the threats in the future are likely to differ significantly from those in the past. When you think about the different bubbles we've had over the past 30 or 40 years, they're all very, very different. And I imagine that one set of tools that would work very well over the cycle for one set of bubbles might not be totally adequate for another.

As a result, I don't view macroprudential policies as being at a level of maturity in the United States that we would likely be able to deploy them very successfully to achieve our

financial stability objectives. That said, I do think a number of policies that have up to now been primarily microprudential in nature, such as CCAR, CLAR, and supervisory guidance, could also be used to achieve macroprudential objectives. I suspect that having a CCAR stress test include a significant stress to one particular asset class or activity that we were concerned about from a financial stability perspective—take commercial real estate lending as an example—could influence the credit provision to that sector by driving up the shadow price of capital for that activity.

This suggests to me that we should do more work in three areas: First, work with other regulatory agencies to sensitize them to the importance of financial stability and to broaden our collective macroprudential toolkit; second, continue to develop how our microprudential instruments could be adapted to pursue macroprudential objectives; and, third, explore in what circumstances monetary policy might play a role. Can it be used effectively to fill in the cracks, or are its financial stability effects likely to be very limited relative to the consequences to broad macroeconomic activity? And what's the cost-benefit tradeoff here?

With respect to monetary policy, I have to admit some skepticism about its efficacy to achieve financial stability objectives. As I see it, in most cases the benefits of a tighter monetary policy in curbing excess in a particular sector are likely to be outweighed by the costs in terms of greater deviations from the Committee's medium-term employment and inflation objectives. But I think this conclusion depends on the particular circumstances. For example, how big the sector is and how sensitive it is to monetary policy probably matter in terms of that cost-benefit tradeoff. If the sector that is out of balance is large—think residential housing—and that sector is very sensitive to interest rates, then I would think the benefits of monetary policy would likely be higher.

Also, monetary policy might be useful in terms of signaling our concern. One thing we didn't talk about very much today was expectations, and I think expectations do matter. And if the central bank protested against how a sector was evolving, this might result in meaningful changes in behavior beyond those just generated by the change in the prospective path of short-term interest rates. In monetary policy, we really have a very well developed theory of how these expectations tend to influence behavior. We don't really seem to have that same work developed on the macroprudential side yet. I recall how the Carter Administration's implementation of credit controls in the spring of 1980—and one could argue that was a macroprudential measure—had a very powerful effect well before the controls actually were binding. Now, this was not a particularly successful experiment, as it worked a lot more effectively than they imagined. But it does, I think, underscore the importance of expectations.

So the bottom line for me is, I wouldn't rule out using monetary policy to achieve financial stability objectives, but I certainly would try to use microprudential and macroprudential tools first to the extent that that was feasible. Thank you, Madam Chair.

CHAIR YELLEN. Governor Tarullo.

MR. TARULLO. It's maybe a bit unfair to have the first word and then try to have one of the last words, but I did want to make a couple of observations about the tenor of the conversation.

First, I guess I don't agree with those who say that we understand how monetary policy works really well, we just don't understand how macroprudential policies work. I've spent seven years here being surprised at how much uncertainty there actually is on the transmission mechanisms for monetary policy. And I keep coming back to our reliance on inflation expectations—something that's undertheorized, undocumented, and hard to pin down

empirically. So while there's certainly more work to be done, I just don't think it's as radical a distinction as some have suggested.

A corollary to that—and this is what I thought Stan and I were trying to get at early on, without success—is, in thinking about the idea, it's not just popping bubbles. The popping bubbles thing is an enormous problem. If you get to the point at which you have the bubble and you're going to try to use monetary policy to pop it, then the sort of thing Charlie was talking about is absolutely going to ensue. But, presumably, monetary policy, and how it operates and what effects it has, differs across conditions of countries as well as within particular economies as those economies and their financial systems evolve. And I think we at least have to be somewhat open to the possibility that the ways in which our economy and financial system have evolved are such that it's not just a Hippocratic Oath thing in which you can't use monetary policy to do something about financial stability because you may do harm. It may be, and I underscore may be, that monetary policy itself is creating some of the problem. And I think we just, intellectually, need to be a bit more open to that. You know, there are many times in the past two years when I've missed having Jeremy on this corridor. Today is way high up on my list of times when I wish Jeremy were here to give what I regard as his very powerful, somewhat alternative view of the way in which monetary policy operates.

MR. EVANS. Can I ask you just a clarifying question about what you're talking about? Because I thought that the premise of what I was talking about was, you're about to make a monetary policy decision on the basis of how you think the economy is going, and then all of a sudden somebody says, "Wait a minute. Financial stability is more of a problem." Then you do something different, and that's presumably going to push you away from what you thought you were trying to achieve. That's the context.

MR. TARULLO. Charlie, the point I was trying to make—and I think a number of other people did try to make—was, it is not at all clear that there is a sharp distinction between the traditional dual-mandate and financial stability considerations. And that is certainly the case in the way in which some have described the situation in which if you pursue a monetary policy that raises a reasonably high risk of a financial stress period resulting in the diminution of employment and, indeed, of inflation, then you can question whether, just within the dual mandate, you've perceived the proper policy. Now, that depends on your own assessment of what those causal relationships are, but I was trying to suggest that it's something that, intellectually, is perhaps more appropriately on the table than some would have it.

All right. Let's put aside the intellectual stuff for a second. I really want to underscore just the practical things, which Governor Brainard, President Kaplan, and several other people mentioned. First, the "we" of the FOMC has only one tool—or set of tools, but it's basically with regard to monetary policy. We don't have all these regulatory, supervisory, other tools. Now, a subset of us has some more, but not unlimited ones. And I really do think it's important to consider how we would react, in view of all the things that we don't like about the absence of tools and the fact that I have been singularly unsuccessful in getting the market regulators to think in terms of prudential market regulation. I think we still need to think about that.

Moreover, you can't just fall back on saying, "The Board needs to do a better job in regulating and supervising financial institutions." The reasons for that, I think, are pretty self-evident. We've already seen, as we increase regulatory requirements—which I am all for, as people know—you begin to see leakage out of the system. And the longer we have tougher requirements in place, the more incentive there's going to be for those who to this point have not tried to create synthetically large balance sheets in order to do things that right now only a Citi or

a J.P. Morgan can do. There's going to be more incentive to do that. And so even if you think the Board has the responsibility for being tough on banks and all of that, that's not going to be effective over the medium term, either.

And so I think we have to contemplate, as I said earlier, the world as it may be. What I worry about is that some people just want to say, "It's somebody else's problem. It's not our problem." Just as, in the fiscal area, we may wish that some people did a better job—and several of you may wish that the five of us did a better job than you think we're doing—but that's going to be the case sometimes. And that's what I want to think about. And, President Kashkari, I'm not too worried about the fact that you couldn't get everybody at the Minneapolis Federal Reserve to agree. You've only been here a few months. I've been here seven years. You can never get everyone around this table to agree. [Laughter] But we still have to make decisions sometimes. Sorry, Madam Chair.

CHAIR YELLEN. Okay. Let me just wrap up quickly so we can get to lunch. I want to again thank all the staff involved in this effort for your work and thank everyone around the table for very thoughtful comments and for sharing your views.

I think, listening to what I heard around the table, the bottom line is that everyone recognizes how important macroprudential tools are and the progress we have made, at least in putting in place through-the-cycle or earthquake-type policies to strengthen the banking system and other aspects of the financial system as well. But I've also heard most of you recognize that we have very significant gaps in our toolkit and that the framework for coordination among U.S. agencies in implementing macroprudential policy leaves much to be desired. On occasion there have been political constraints in deploying these policies. And probably the legislative framework in place for the various regulators to take account of systemic risk, as opposed to

narrower mandates, leaves many holes and gaps in the macroprudential framework to address financial-stability risks.

Everybody recognizes how costly it could be to use monetary policy to address financial stability threats, in view of the potential cost to achieving our macroeconomic goals. But on the other hand, I think what I've heard most of you recognize is, the bottom line probably should be to never say never, and that there could potentially be situations in which we might want this Committee to take financial stability considerations into account. Those situations might be limited. But it's probably important to think more seriously about what those situations might be, whether we could identify them, and how to address them.

I think perhaps a natural starting place would be to ask President Rosengren and Governor Fischer for your committees to collaborate in thinking about what further work we could do or exercises we might have. I will talk with the staff, and we'll try to follow up and consider what more we could do in terms of research and analysis that would clarify what those situations might be in which it would be important for this Committee to be thinking about financial stability concerns in our design of monetary policy.

Thank you all for a very useful, thoughtful discussion, and let's take a break for lunch.

[Lunch recess]

CHAIR YELLEN. Okay, folks. Let's move along in our agenda to item 2, and I'm going to call on Simon to deliver the first part of the Desk briefing.

MR. POTTER.[2] Thank you Madam Chair. I'll first cover global financial market developments. Lorie will then review money markets and Desk operations, and I'll conclude with a discussion of the results of the Desk's recent strategic review of the foreign portfolio investment framework.

The stabilization and recovery in global risk asset prices that started in mid-February continued into April. This is reflected in a broad easing across key

[2] The materials used by Mr. Potter and Ms. Logan are appended to this transcript (appendix 2).

measures of domestic financial conditions over the intermeeting period, as shown in the top-left panel of the first exhibit, with interest rates lower, the dollar weaker, equity prices higher, and credit spreads narrower. However, compared with levels prevailing just before to last August's RMB devaluation, financial conditions are more mixed.

To gain insight into the relative importance of various factors driving global financial markets, we again included a special question in the Desk surveys, but this time we asked for a ranking of factors that calmed markets, rather than the March question on factors that had sparked volatility. To allow direct comparison with the results of the March question, we asked respondents to rate the same set of factors. As shown in the top-right panel, on average, Chinese FX developments and volatility in oil markets again received high ratings, likely reflecting the calming effects of the moderation in RMB volatility and the increase in oil prices above $40 over the period. One notable feature of the results is that FOMC policy was identified as a more important factor in calming the volatility than it was in creating it. The individual responses, not shown, are especially striking, with most respondents giving a higher rating to FOMC policy as a calming rather than a sparking factor. Moreover, in aggregate, buy-side respondents ranked Federal Reserve policy above all other factors in explaining the recent decline in volatility. A consistent feature in the Desk's April surveys was, buy-side respondents are expecting a more aggressive response from the FOMC to deviations from what they perceive as mandate-consistent trajectories. More generally, numerous market participants have pointed to an increased focus by the FOMC on global financial developments over recent months as a significant change in emphasis. Steve will discuss this more in his briefing.

Some of this sentiment was clearly driven by the March FOMC events and the Chair's subsequent speech and is directly reflected in a notable adjustment in market participants' near-term policy expectations. More specifically, short-term interest rates fell sharply around the March meeting, driven by declines in the medians of the SEP policy rate forecasts and the explicit reference in the statement to risks posed from abroad. As shown in the middle-left panel, the two-year Treasury yield fell 11 basis points on the day of the meeting—a large adjustment, though consistent with historical responses to the raw changes in the median SEP projections. At the most recent meeting, Thomas and I tried to reassure President Williams that markets would be more nuanced than just looking at the raw change in the median dots, particularly given the expectations for a 25 basis point drop in the median dots. The record presented in the panel is more consistent with the headline effect of the SEP change being the driving force behind market reactions.

The market-implied probability of a rate hike at or before the June meeting declined significantly over the period, as shown by the light blue line in the middle-right panel. On the basis of current market pricing, the probability of a rate hike at the April meeting is effectively zero, and the probability at the June meeting has declined to about 20 percent. Responses to the Desk's most recent surveys are in line with this market pricing, with the average probability assigned to a June hike at 22

percent. Some market contacts think that for a rate increase to be delivered in June, the FOMC would have to start preparing the market as soon as this meeting's statement. For context, compared with the experience last year ahead of liftoff, as shown in the dark blue line, the market-based probability of a rate hike at or before the June meeting is currently below the probability of a hike that was priced in the same number of days ahead of the December meeting.

The market-implied path of the policy rate continued to shift down over the period, as seen in the bottom-left panel. Prior to the March meeting, a 25 basis point increase in the federal funds rate target range was fully priced in by the fourth quarter of 2016, but this was pushed out to mid-2017 in response to key FOMC communications over the intermeeting period. The survey-implied mean path of policy also shifted down. In particular, in the scenario in which the policy rate does not return to the zero bound in the next three years, market participants anticipate the policy rate will be raised more gradually than previously expected.

Medium- and longer-term U.S. Treasury yields fell modestly, on net, over the period. Market contacts largely attributed the declines to easier monetary policy abroad, which in turn prompted inflows into U.S. Treasury securities, particularly because, as shown in the bottom-right panel, yields on Treasury securities are high relative to yields on sovereign bonds in other G-7 countries. Over the period, declines in U.S. real yields outpaced declines in nominal yields, leaving market-based measures of U.S. inflation compensation slightly higher. Inflation compensation moved up with the more accommodative FOMC communications and gains in oil prices, then fell back somewhat in response to below-consensus inflation data in mid-April.

Lower domestic short-term rate expectations led to a slight narrowing of interest rate differentials between the United States and other countries, as shown in the top-left panel of exhibit 2. The narrowing spread contributed to a decline of 2.6 percent in the Bloomberg Dollar Index over the intermeeting period. This brought the cumulative decline in the index over the past two intermeeting periods to over 5 percent—the largest such decline since the financial crisis, with significant declines associated with FOMC communication. Incrementally contributing to the dollar move, some market participants discussed the possibility of an informal currency agreement brokered at the February G-20 meeting.

Both the weaker dollar and the more gradual expected path of U.S. policy rate increases were perceived by market contacts as supporting domestic risk asset prices over the period. As shown in the top-right panel, the S&P 500 returned to early August 2015 levels and is currently within 2 percent of its all-time nominal high. Further, option-adjusted spreads on high-yield corporate bonds continued to narrow, mirroring an increase in oil prices as the energy subindex accounted for the majority of the improvement.

Investors generally perceived China as less of a near-term risk factor this intermeeting period than earlier in the year amid stability in the renminbi–dollar

exchange rate, additional easing measures in China, and perceptions that easing measures are gaining traction. Market participants suggested the broad depreciation of the U.S. dollar helped ease pressure on the RMB and lessened the urgency for Chinese officials to provide more clarity on its exchange rate policy. Market expectations for a sharp devaluation of the renminbi declined, as reflected in the middle-left panel. The relative cost of protection against a depreciation of the RMB, as implied by options, eased to the lowest level this year, and similar measures of volatility also subsided.

Beyond China, sentiment toward emerging markets also perked up, supported by a trifecta of tailwinds: lower U.S. interest rates, the stabilization in oil prices, and moderating concerns over China. As shown in the middle-right panel, EM equity and bond funds registered their first consecutive months of net inflows since 2014, and an index of broad EM ex China currencies increased against the dollar alongside the shift in capital flows. The MSCI EM equity index rose 6.8 percent, extending its strong year-to-date performance despite the January financial market volatility. The global search for yield also benefited EM assets, as illustrated by Argentina's return to the international bond market after a 15-year absence.

Despite the continued stabilization and recovery in risk assets over the period, concerns regarding longer-running global themes persist. Market contacts continued to question the monetary policy efficacy of the Bank of Japan and, to a lesser extent, the European Central Bank. Foreign exchange markets continue to send the strongest signal: Since these two central banks added incremental accommodation in January and March, respectively, both the euro and yen have appreciated notably versus the dollar, as shown in the bottom-left panel. In fact, despite the combined force of the yen's recent sharp appreciation, expectations for the BOJ to add accommodation, and mounting expectations for intervention to weaken the currency, net positioning by speculative investors for further yen appreciation has reached its highest level since the 1990s. For both the BOJ and ECB, market commentary continues to question the ability of available tools to realize their policy objectives. Indeed, five-year, five-year inflation swap rates in the euro area and Japan have fallen since the two central banks announced their respective large easing measures, and banks have continued to struggle in the low-growth and negative interest rate environment.

Elsewhere, a new global risk came into focus—the U.K. referendum vote on European Union membership on June 23. The outcome is currently seen as a close call by market participants. As shown in the bottom-right panel, market participants seem to be pricing in substantial event risk in the foreign exchange market: The relative cost of protection against a large sterling depreciation against the dollar rose discretely as the related option expiration date spanned the referendum date. More directly relevant to U.S. monetary policy, several market participants have suggested the referendum could present an obstacle to any desire by the FOMC to tighten policy in June, due to the possibility of widespread volatility in European financial markets following a "leave" vote in the referendum and amid a perceived increased responsiveness of monetary policy to global developments.

MS. LOGAN. Our experience during the intermeeting period continued to suggest the operational framework has been effective in maintaining control over the effective federal funds rate. As shown in the dark blue line in the top-left panel of your next exhibit, the effective federal funds rate continued to print at the center of the target range outside quarter-end. On March quarter-end, the effective rate printed at 25 basis points, a smaller decline than the change observed on December 31.

This control also continues to extend to other money market rates. The overnight Treasury GCF rate, shown as the dark red line, mostly continued to trade in the upper half of the target range. This series provides an indication of the rate at which some dealers that are perceived as less creditworthy can finance Treasury securities, and it is also a useful proxy for the rate at which some buy-side firms obtain financing for these securities. The broader overnight Treasury triparty repo rate, excluding GCF and Federal Reserve RRPs—the rate at which stronger dealers tend to obtain financing from money funds and other cash investors, shown in the light red line—generally traded in the lower half of the range. Treasury bill rates declined modestly, as shown by the light blue line, as Treasury bill issuance began its typical seasonal decline associated with the April tax receipts.

The stability of the effective rate and other money market rates has come in the context of low usage of the overnight RRP facility, as shown in the top-right panel. Excluding the March quarter-end, when demand for the facility increased to $304 billion, overnight RRP usage averaged less than $50 billion over the intermeeting period and reached a trough last seen in December 2013. Market participants have attributed the low usage to the larger supply of—and, in most cases, higher rates offered by—other money market investments. As shown in the middle-left panel, supply of these assets has increased since last year despite the more recent seasonal tick-down in Treasury bill supply that I just mentioned.

Although overnight RRP usage has been low—certainly lower than market participants' expectations before liftoff—cash investors continue to suggest the facility enhances their bargaining power when negotiating rates on money market instruments. In any case, low usage may not persist for two reasons. First, estimates are for Treasury bill supply to fall roughly another $120 billion through the end of June. This should put further downward pressure on Treasury bill rates and limit investors' reinvestment options when their existing bill holdings mature, particularly for government money funds. Second, there is considerable uncertainty regarding how SEC money market fund reform, which takes full effect this October, will affect demand for different money market instruments, including Federal Reserve RRP. As we've discussed in the past, the reforms are expected to lead to flows from prime funds into government funds, increasing demand for government securities and repo investments, which could include Federal Reserve RRPs. As shown in the dark blue bar in the middle-right panel, the conversion of prime funds into government funds is well under way, with Federal Reserve RRP counterparty prime funds totaling $225 billion in AUM already having switched to become government funds. About $800 billion in prime funds, the red bar, have announced that they will not convert, while another $330 billion is yet to be determined. So far, the money fund industry appears

to be adjusting smoothly to the new reforms. However, it's important to note that it may not be clear for some time how end investors will respond to these changes.

Money fund preparations for upcoming SEC reforms continue to affect the RRP counterparty list. Over the intermeeting period, 5 RRP counterparties were removed from the list. Money fund counterparties now total 105, with total RRP counterparties at 138. I should note that the staff continues progress on the broader Desk counterparty framework, which we intend to bring to the Committee in the fall. As part of this framework, we intend to clarify that our counterparties for foreign exchange operations will be required to adhere to best practices, including the FX global code of conduct, which is in the process of being established under the umbrella of the BIS Foreign Exchange Working Group. A draft of part of this code will be released publicly in late May, and the full code will be finalized next year.

As discussed in the memo sent to the Committee on April 19, we request that the Committee vote to renew the standing liquidity swap lines with the Bank of Canada, Bank of England, Bank of Japan, ECB, and Swiss National Bank, as well as the North America Framework Agreement, or NAFA, arrangements with the central banks of Canada and Mexico. The liquidity swap lines and NAFA arrangements are a tangible and constructive signal of cooperation among central banks, and we view the costs of maintaining the lines as minimal. The liquidity swap lines also support the approach that the Federal Reserve, along with other major central banks, endorsed that there are "no technical obstacles" to central bank capabilities to provide liquidity quickly to a systemically important financial market utility. In this context, the Desk annually tests its NTO operational framework with the Bank of England and recently finalized a similar NTO framework with the Bank of Canada.

Importantly, reauthorization does not constitute automatic approval of any request to use the lines. All drawings are subject to the approval of the Chair in consultation with the Foreign Currency Subcommittee, and the Chair or subcommittee would consult with the FOMC, if possible, before the initial drawing on the dollar or foreign currency liquidity swap lines. Foreign central bank counterparts support the renewal of these arrangements.

As shown in the bottom-left panel, recent usage of the swap lines has been low. Other than occasional increases in the cost of dollar funding on quarter-ends, it remains cost effective to obtain dollar funding through the FX swaps market. That said, FX swap bases, which represent the cost of dollar funding via the FX swap market minus the cost of funding directly, have widened over the past two years, particularly for the euro and yen, as shown in the bottom-right panel and also discussed in Tealbook A. Market participants do not believe this increase indicates acute dollar liquidity pressure. Instead, they argue that divergent monetary policy stances have contributed to an imbalance between the demand for dollar-denominated assets and the supply of euro- and yen-denominated liabilities, and that increased balance sheet costs, in part as a result of regulatory reforms, have made it more costly for banks to provide the FX swaps liquidity needed to arbitrage the difference in dollar borrowing costs.

On a final swaps-related note, the Desk recently conducted a small-value exercise to draw euros from the ECB. The test was not fully successful, as a delay in trade execution and confirmation prevented the movement of euros before the close of the euro area's payment system—though in an actual period of financial stress, the ECB may have agreed to extend operating hours. The experience highlights, though, the value of these exercises in identifying risks to our operations. A summary of the other small-value exercises conducted over the intermeeting period, along with a list of upcoming intended exercises, is shown in the appendix of your handout.

Finally, to follow up on the previous meeting's update on SOMA foreign exchange reserves holdings, I wanted to report that total interest income on the portfolio remained marginally positive in March, at about $100,000. As shown in the top-left panel of your final exhibit, we anticipate that income on the euro portfolio will turn negative in April. And although yen portfolio income will likely remain positive, we estimate that total income, which is not shown, will be negative. April income will be reported publicly for the first time in late May in the financial statement of the Treasury Exchange Stabilization Fund, which the Desk manages in an identical manner to the SOMA portfolio.

The experience of investing the foreign portfolio in a negative rate environment has highlighted the need for a more systematic framework for the investment of the portfolio, one that would be more flexible to changes in market conditions or policymakers' preferences. The staff recently completed a strategic review of the portfolio with these goals in mind, and Simon will now discuss that in more detail.

MR. POTTER. As discussed in the memo I sent to the Committee on April 18 and outlined in the top-right panel, the review addressed the policy purpose for holding FX reserves, the investment approach, and the internal processes that support ongoing FX reserve management. As we conducted the review, we received feedback from the Foreign Currency Subcommittee and U.S. Treasury officials. As Lorie just noted, it's important to bear in mind that we manage the ESF and SOMA portfolios identically. Both the size and currency composition of the portfolios were taken as given, although we intend to think further about those issues in a subsequent stage of the project.

Historically, the Desk has managed the portfolio by laddering investments in eligible assets evenly across maturities, subject to a duration limit. The staff's proposed new investment framework establishes a process for assessing policymakers' investment preferences for the period ahead and uses a more robust risk–return methodology that incorporates those preferences.

As described in the middle-left panel, the new investment framework has five steps, each intended to be periodically reassessed. The first step is to establish the policy purpose for holding FX reserves. The staff's assessment is that the purpose of the portfolio is to provide resources that can be used to conduct purchases of U.S. dollars, giving policymakers an important tool with which to counter disorderly conditions in FX markets and influence the exchange value of the dollar. The Federal

Reserve and the U.S. Treasury—the U.S. monetary authorities—have closely coordinated on such operations since 1962, although, of course, the Treasury has the lead role in setting U.S. exchange rate policy.

The second step is to establish the investment objectives. Our assessment is that the primary investment objective of the portfolio is liquidity, as the timing and size of an FX intervention cannot be known in advance. We propose that the next objective is safety, which translates into a strong preference for low-risk investments, and that the final objective is return, which suggests that the portfolio should be invested to earn the highest expected rate of return in view of policymakers' risk preferences.

The third step is to determine funding needs, estimating the amount of funding that U.S. monetary authorities are likely to require in the event of an intervention to purchase dollars. In view of recent history, our current estimates for funding needs are based on the assumption that U.S. monetary authorities would conduct an intervention to either reinforce the signal of a foreign monetary authority or reduce FX market volatility. To arrive at an estimated funding need, we considered the history of such reinforcing or market-calming interventions and scaled up the transaction amounts to account for growth in FX markets. This approach suggests a funding need of $8 billion across the SOMA and ESF portfolios, or about 5 billion euros or 275 billion yen.

The fourth step is to establish appropriate risk constraints on the basis of policymakers' willingness to bear market, credit, and liquidity risk. Some of the considerations here are given as the fourth item in the middle-left panel. These were discussed in detail in the memo, and I will just focus on the risk–return constraint produced by the need to assure, with high probability, adequate intervention capacity. To analyze this, we focused on the concept of expected shortfall from model returns at the first percentile. We recommend limiting the expected decrease in intervention capacity in this adverse market scenario to 4 percent or less.

The final step is to formulate an asset allocation for the funding needs and investment risk preferences we've defined. This step provides a benchmark allocation for managing the portfolio that reflects policymakers' risk tolerance. We place an additional constraint of no asset sales to achieve the new asset allocation.

Some features of the new portfolio allocation are shown in the middle-right panel. For the euro portfolio, the shift would increase holdings of cash and longer-term sovereign debt. Relative to the current portfolio, the resulting asset allocation would increase the projected one-year market return from negative 23 basis points to positive 12 basis points. It also involves some increase in portfolio risk. For example, if total liquidation of the portfolio was necessary in a very adverse environment, intervention capacity would be reduced by 200 million euros from that of the current portfolio.

For the yen portfolio, the new allocation is affected by the fact that the Bank of Japan currently offers a rate of 0 percent on our deposits despite the negative yields

on much of the universe of Japanese sovereign debt. In contrast, our deposits with the euro system earn, on the margin, negative 55 basis points. Due to the higher return on BOJ deposits, we propose moving maturing holdings into cash. This recommendation would need to be revisited in the event that the BOJ lowered the interest rate offered on official deposits to the U.S. monetary authorities.

As I noted, this allocation, along with our recommendations about the risk constraints and their recommended settings, reflect discussions with the Foreign Currency Subcommittee and U.S. Treasury officials. We welcome your feedback as well. Our goal is to implement the new framework later this year. These changes to the framework also intersect with another effort currently under way to revise the set of foreign authorization documents, which we will return to at a future meeting. The revisions to the governing documents will require a vote by the Committee.

Thank you, Madam Chair. That concludes our prepared remarks. We would be happy to take questions.

CHAIR YELLEN. President Lacker.

MR. LACKER. Thank you, Madam Chair. I just want to say that I applaud the Desk staff for undertaking a rigorous look at how we manage the foreign exchange reserves we find ourselves with. They've grounded their approach in what seems like a reasonably sensible set of principles, and I think that should protect us from undue criticism regarding stewardship of these funds. I think that's important.

I want to point out, though, that the magnitude of the estimate of the funding needs just highlights what an anachronistic arrangement these funds represent. I find it hard to believe that anyone believes a $6 billion intervention in the euro-dollar market would make a meaningful difference and would leave some imprint. This is trivial in relation to the size of U.S. reserve account balances or European reserve account balances. And under current operating procedures when we set the IOER rate, it's hard to see how monetary conditions would change in the United States. So it would be exactly like the old regime in which sterilized foreign exchange interventions were basically meaningless. Now, the only real effect it could have is if it signaled something about the future course of monetary policy. But because the Treasury is

acknowledged to be in the lead and have the authority over U.S. dollar policy, it's sort of problematic for the independence of our monetary policy if we're perceived to be bending future monetary policy at the behest of the Treasury's desires about dollar policy.

In Richmond we've complained about these arrangements for a couple of decades now. We don't expect a lot of action soon. [Laughter] But at some point we need to start educating policymakers and the public about these arrangements, that the operations really are anachronistic and don't really do any good, and maybe convince them we could eliminate the funds, give the money back to the Treasury, or do something else with them. Thank you, Madam Chair.

MR. POTTER. Just to support President Lacker's point a little bit, if we used the whole portfolio tomorrow, it would be less than 2 percent of the daily flow in euro and yen with the dollar cross. So there's some evidence to support what you said.

MR. LACKER. Thank you, Mr. Manager. [Laughter]

CHAIR YELLEN. Fair enough. But it's also been little used. And my sense is that when it has been used—and, if I'm not mistaken, the last time we intervened was following the Japanese earthquake. And it was a coordinated, small intervention by the G-7. Our participation was centrally symbolic to support the Japanese. And these do seem like symbolic amounts to me. In that sense, I take your point. But sometimes symbolism and coordination do make a difference. And we're not forced to follow the Treasury. We typically have gone along with them. But, aside from that, has there been any intervention at all over the past 20 years?

MR. POTTER. The last intervention before that was September 2000, when we purchased euros in conjunction with other central banks and the U.S. Treasury. That was a time when there were some doubts about the euro. Its exchange-rate value was down in the mid-80s,

and we got together and tried to convince people with a signal—not about future monetary policy, but I think that we were happy to acquire euros. So those are the two most recent interventions. If you go back to the 1980s, they're much larger. I have an example of the equivalent of $80 billion over a few days when it was announced that Chairman Volcker would not be reappointed, I believe.

MR. LACKER. "Symbolic" is a good word for it.

CHAIR YELLEN. Are there other comments or questions on anything that Simon and Lorie covered? [No response] Okay. Seeing nothing, I am going to ask for separate votes on the NAFA arrangement and the liquidity swap agreements. Let's start with the NAFA arrangement, our standing swap lines with Canada and Mexico. Do I have a motion to approve?

VICE CHAIRMAN DUDLEY. So moved.

CHAIR YELLEN. Thank you. Are there any comments on those? [No response] Okay, then I'm going to ask for a vote. This is only for voters. All in favor? [Chorus of ayes] Any opposed? [No response] Okay. So the NAFA arrangement is approved. Let's move along to the liquidity swap agreements. Do I have a motion to approve?

VICE CHAIRMAN DUDLEY. So moved.

CHAIR YELLEN. Thank you. And then again, any comments on these? [No response] All in favor? [Chorus of ayes] Any opposed? [No response] Okay, great. And, finally, I need a vote to ratify domestic market operations. Do I have a motion?

VICE CHAIRMAN DUDLEY. So moved.

CHAIR YELLEN. All in favor? [Chorus of ayes] Okay, great. So then we're going to move now into our go-round on the economic and financial situation. I'd like to call on Bill Wascher to begin the briefing.

MR. WASCHER.[3] Thank you, Madam Chair. I'll be referring to the set of materials with the cover page that is titled "The U.S. Outlook."

This is now the third year in a row that I've presented the staff economic forecast at the April FOMC meeting. And it's the third year in a row that I've had to warn you that real GDP growth in the first quarter will be close to zero—or possibly even negative. For all our sakes, I might ask David Wilcox to get somebody else to do this briefing next April. [Laughter]

In any event, the incoming data on spending and production for the first quarter have once again surprised us to the downside. Panel 1 of your forecast summary exhibit shows how various nowcasts of first-quarter real GDP growth have evolved since the time of the March Tealbook. These nowcasts include the Board staff's weekly judgmental forecast as well as various model-based estimates produced at the Board and elsewhere in the System. As you can see from the black line, we have reduced our judgmental estimate of first-quarter real GDP growth to an annual rate of just ½ percent, down from about 2 percent in the March Tealbook. Nowcasts generated using our dynamic factor model—the red line—have also drifted lower on net, and the model's point estimate is not very different from our Tealbook forecast. There is, of course, still a considerable amount of uncertainty about what actually happened last quarter—a fact that is apparent both from the range of nowcasts implied by other System models (the blue dashed lines) as well as from the gray shaded region, which gives the 70 percent confidence interval surrounding the Board staff's factor model estimate. The BEA will publish its advance estimate of first-quarter GDP growth on Thursday.

As we did in the previous two years, we have treated the weakness in first-quarter GDP growth as largely temporary. As you can see from the black line in panel 2, we expect real GDP to rise at an annual rate of 2¼ percent in the second quarter, a pace that is little different from our March forecast. In coming to this assessment, we have taken a strong signal from last month's employment report, which indicates that the labor market continued to improve at a pace that was closely in line with our expectation from the March Tealbook and suggests to us that the economy's fundamentals remain basically sound. Our second-quarter GDP growth forecast doesn't appear to be wildly at odds with the estimates from the staff's factor model or the available estimates from the System models, although the size of the confidence interval surrounding our factor model forecast gives a good idea of how little hard evidence on current-quarter spending and production we—or the models—have to go on at this point.

This morning we received the March advance report on capital goods orders and shipments, which looked to be a little weaker than we were expecting. Our preliminary analysis suggests that these data would not affect our first-quarter GDP

[3] The materials used by Mr. Wascher are appended to this transcript (appendix 3).

estimate but would subtract one-tenth or two from our projection of second-quarter growth.

Although our forecast of near-term real GDP growth after the first quarter is not very different from our previous projection, the level of real GDP is somewhat lower. However, as we have often done on previous occasions when the labor market and spending data have sent conflicting signals about the state of the economy, we have attributed some of the first-quarter weakness in real GDP to statistical noise and made a downward adjustment to potential output that, in turn, yields a correspondingly smaller revision to our estimate of the output gap. As a result, our judgmental estimate of the economy's current cyclical position is only a little weaker than what we had written down in March.

Over the remainder of the medium term, our outlook for real GDP growth—panel 3—is slightly higher than in our March projection. Current and expected financial conditions—including the lower assumed exchange value of the dollar, a lower path of long-term interest rates, and a higher level of equity prices over the medium term—are now a little more supportive of economic growth than they were in our previous forecast. Hence, our unemployment rate forecast—panel 4—is a touch lower than in March.

The bottom two panels of this exhibit provide a small window into the question of how widely shared the economic recovery has been by comparing the extent to which different racial and ethnic groups have experienced a narrowing in two measures of labor market slack that we often highlight. I'll start with panel 5, which plots the unemployment rate for blacks or African Americans (the blue line), Hispanics or Latinos (the red line), and whites (the green line). Note that these groups are not mutually exclusive, in that both the black and white categories include some Hispanics. As is typical in a recession, unemployment rates for the two minority groups rose more sharply than for whites in 2008 and 2009, peaking at nearly 17 percent for blacks and at almost 13 percent for Hispanics. The unemployment rates for those groups then fell more quickly over the recovery, eventually bringing the differentials in the jobless rates essentially back down to where they were before the recession. While that's obviously good news, the fact that the black–white unemployment rate differential is no smaller than it was 15 years ago is more discouraging.

Panel 6 provides a similar set of comparisons for those who are working part time and would like a full-time job but can't find one. As for unemployment, the percentages of employed blacks and Hispanics who are working part time for economic reasons rose more than for whites following the 2007 business cycle peak, with the run-up particularly steep for Hispanics. The shares for all three groups have come down during the expansion. However, for both blacks and Hispanics, the gap relative to whites remains higher than it was in the years preceding the Great Recession.

The panels on the next page summarize the inflation outlook. Our projections regarding both total PCE inflation—panel 7—and core PCE price inflation—panel 8—are little changed from March. The recent data on core prices, which include the BEA's estimates through February and our translation of the March CPI and PPI, have come in consistent with our expectations, and we continue to project core PCE inflation to step down modestly over the course of this year. This pattern is, in our view, partly attributable to the presence of residual seasonality in these data, which causes core inflation in the first part of the year to come in higher than average, followed by below-average readings later in the year. Additionally—and in line with our interpretation at the time of the March Tealbook—we think that core inflation was temporarily boosted in the first quarter by several erratic components of the price indexes. This view seems consistent with the dropback in these components in the March CPI data. Beyond this year, inflation is projected to move up to 1.8 percent by 2018, as the restraint from energy and import prices wanes and as resource utilization tightens further in an environment of reasonably stable long-run inflation expectations.

The next two panels reproduce the April Tealbook's inflation monitor exhibits, which show the sources of the revisions that we have made since December to the outlook for total and core PCE inflation. As indicated by the black lines in the panels, our total and core inflation projections are, so far, not very different from our December Tealbook forecasts. In addition, with the exception of a small upward revision to the contribution that we expect import prices to make to this year's core inflation rate—the blue portion of the second stacked bar in panel 10—these panels don't look too different from the corresponding charts that David Wilcox showed you at the March meeting.

As you may recall, in our previous projection we made a downward revision of 5 basis points to our estimate of underlying inflation—the gray portion of the stacked bars in panel 10—in response to the recent low readings from some market- and survey-based indicators of longer-term expected inflation. As you can see from the solid black line in panel 11, the preliminary estimate of median longer-term expected inflation from the Michigan survey moved down 0.2 percentage point in April, returning this series to the very low level that prevailed at the time of the March Tealbook.

Finally, the next page resurrects the so-called Lockhart dashboard that provides a high-level summary of some of the key pieces of information that will be available to you at the next two FOMC meetings. Specifically, the data that will first be available at the June meeting are in the gold-shaded region of the table, and the additional observations that will become available in time for the July meeting are shaded in red. The data that are newly available for today's meeting are shaded in blue. The April Tealbook projections of these variables are shown in regular font, and the corresponding projections from the March Tealbook are shown in italics. On a 3-month-change basis, we anticipate that headline PCE inflation will pick up over the near term as energy prices stop declining. As I noted earlier, however, core inflation is expected to step down. On a 12-month-change basis, we expect total inflation to

run at or below 1 percent and core inflation to edge down to 1½ percent. On the real side, we expect that job gains will continue at a solid pace and that the unemployment rate will remain around 5 percent. Although revised estimates of Q1 GDP growth will be available at each of the next two FOMC meetings, the BEA's initial estimate of second-quarter growth will not be published until just after the July FOMC meeting. However, if our forecast of a second-quarter pickup turns out to be broadly correct, we might expect to see some evidence for it in the higher-frequency spending data that we will receive between now and the June meeting. Steve will now continue the briefing.

MR. KAMIN.[4] Thank you, Bill. I'll be referring to the materials titled "The International Outlook."

Your first panel of that exhibit shows the results of a word search of FOMC minutes over the past 1½ years and indicates the number of times that the words "dollar," "China," or "global" appeared in the summary of your discussions. Although we in the International Finance Division welcome the increasing attention you've been giving international matters of late, we realize that this attention reflects concern and not satisfaction with the global situation, and we have been asking what it would take for the word count to go down in future meetings. Accordingly, we've developed the handy checklist shown in panel 2 to help monitor foreign developments and assess whether the headwinds to the U.S. economy coming from abroad might be abating. Feel free to check the boxes as I go along, but don't worry—we are not adding this to the SEP. [Laughter]

For us to have some assurance that the drag arising from the foreign sector is easing, we first need to see some abatement in the dollar's rise and some pickup in the pace of foreign GDP growth. Here we can check the "Yes" box. As you are well aware, the dollar has been declining since late January; I'll be discussing its future trajectory shortly. And as shown in panel 3, after growing at a very subdued 1¾ percent pace in 2015, foreign economic growth is estimated to have picked up to a 2¼ percent rate in the first quarter. Much of that increase was concentrated in Canada, which is starting to shake off some of its oil-induced woes and which has a very large weight in our trade-weighted foreign GDP aggregate. But economic growth appears to have picked up in other economies, too, including in the euro area and emerging Asia excluding China, and indications are that output at least stopped falling in Japan. To be sure, Chinese economic growth fell, by our estimates, from 7 percent at an annual rate through most of last year to 5½ percent in the first quarter, but we and everyone else had largely anticipated that slowing. And with indicators for March coming in reasonably strong, we're not taking a very strong negative signal from the first-quarter slowing.

Our second condition for an easing of foreign headwinds is some greater confidence that, barring significant new shocks, global growth will firm further, as predicted in our baseline projection. Here, too, we are checking the "Yes" box,

[4] The materials used by Mr. Kamin are appended to this transcript (appendix 4).

although this is by no means a slam dunk. To begin with, after progressively revising down the forecast of foreign economic growth in recent Tealbooks, this round we're actually revising up our Q1 estimate, and our projection further out is little changed. So, all told, that's positive relative to earlier experiences. Additionally, as Simon has described, throughout global financial markets, investor sentiment has continued to improve, equity prices are up, and credit spreads are down, all of which should support growth. As a related matter, oil prices, shown in panel 4, extended their previous gains over the intermeeting period. Ordinarily, we view rising oil prices as a negative for global spending and economic growth; however, at very low levels, declines in oil prices may raise financial stability concerns and induce rapid belt-tightening in oil-reliant economies. Thus, the recent increase in prices may be a positive for the global economy. Finally, our improved confidence in the economic growth outlook is bolstered by the results of our statistical model of the probability of foreign recessions. As indicated in panel 6, reflecting stronger incoming data and financial market settings, we estimate that the probability of a generalized recession abroad occurring over the next 12 months fell from its February peak to near its unconditional mean over the past four decades.

We recognize, however, that all of these positive indications could turn on a dime if investor sentiment turns south again. Accordingly, our third condition for an easing of global headwinds is some confidence that global financial markets have become more resilient, if not to substantial international shocks, at least to the kinds of minor disturbances that the world economy generates as a matter of course. Here we can at best check the box labeled "Maybe." The red line in panel 7—that's on your next exhibit—shows a measure of financial stress we developed for global financial markets on the basis of a range of indicators, including money market rates, bond spreads, stock market volatility, and credit default swaps. The upswing in stresses evident earlier this year reflected the market's response to a relatively modest depreciation in the RMB and some weak incoming macrodata from around the world. Even at the time, it seemed that the market had overreacted to these developments. The subsequent upswing reflected some correction of this excessive pessimism along with reduced downward pressure on the RMB, which was aided by the broad decline in the dollar; some better macrodata; and revised expectations of FOMC policy, of which I'll say more shortly. More recently, markets have largely shrugged off such concerns as Brexit and the failure of the OPEC production talks. All told, investor sentiment is showing a few glimmers of increased resilience, but hardly enough for us to rule out a future resurgence in stresses.

In particular, we are cognizant of the possibility that, with declines in expected U.S. policy rates and the recent broad depreciation of the dollar having helped calm markets earlier this year, a return to policy tightening could trigger a return to turbulent market conditions. While we view this as a prominent downside risk, however, we have not built it into the baseline. As shown by the blue line in panel 7, which measures the expected 24-month-ahead federal funds rate, anticipations of tighter monetary policy do not always depress global markets. The heightened expectation of monetary policy tightening in mid-2013, highlighted by the first shaded region in the panel, did indeed trigger the taper tantrum, as many investors

who'd been asleep at the wheel were apparently jolted awake by Chairman Bernanke's statements. However, once awakened, investors took the rise in expected policy rates in the first half of 2014—highlighted in the second shaded region—with greater equanimity, and financial stresses actually subsided during this period. By the same token, according to many observers, the downshift in the March SEP's dot plot was so calming because it convinced market participants that the FOMC was not on a preset tightening course but would be responsive to global economic and financial developments. Accordingly, it seems reasonable that gradual future policy tightening would be accepted without undue distress by markets as long as the tightening appeared to be merited by firming economic conditions.

Of course, even if FOMC policy tightening does not trigger market turbulence, it could still boost the dollar. Our forecast, panel 8, is premised on the federal funds rate rising 3 percentage points by end-2018, while market expectations are generally for a smaller rise. We assume that as market participants become surprised by the pace of FOMC tightening, the dollar will rise about 4 percent in real terms against the currencies of other advanced economies, or AFEs. This projection is based on a regression of changes in the dollar on changes in the federal funds rate around FOMC announcements, with a 100 basis point surprise to the federal funds rate estimated to cause a 1.5 percent rise in the dollar. The tightening of FOMC policy is also expected to buoy the dollar against EME currencies, but this effect is offset by our anticipation, shown in panel 9, that China will hold the RMB nearly flat against the dollar for the next year or so before allowing it to appreciate as capital inflows return. All this said, we certainly recognize the possibility that the dollar could rise much faster than we are projecting either because the dollar responds more sharply to expectations for tightening monetary policy than our econometric estimates would suggest, because FOMC tightening does indeed trigger market turmoil, because downward pressures on China's RMB reassert themselves, or because downside risks to the foreign economy materialize.

This brings us to our last condition for improved confidence in the foreign outlook: Have the fundamental risks to the global economy that so worried us earlier this year substantially abated? Here we must certainly check the "No" box. To begin with, we have a relatively new risk to add to our list: Brexit, which may yet disrupt markets as the June 23 referendum draws near, especially if it starts looking more likely the vote will be for the United Kingdom to leave the EU. Even more saddening is the return of that old chestnut, Grexit, as the IMF, EU, and Greece square off over whether Greece will be granted debt relief, posing further challenges to European unity. Much more consequential for the global economy would be "Chexit"—that is, an exit of China from its path of gradual deceleration into a steeper decline as mounting corporate debts and an overexposed banking system lead to financial crisis. And all of these downside risks become more worrisome in an environment in which many central banks are already providing extraordinary stimulus and most governments see little capacity or inclination to provide fiscal support. We anticipate that the BOJ will announce further policy accommodation at its next meeting, and the ECB could add to its stimulus through more asset purchases or cutting interest rates

further into negative territory. However, it's doubtful that such measures would be up to the task of stabilizing their economies in the face of significant new shocks.

So, to sum up, in terms of our conditions for a reduction of the time you spend discussing foreign developments and risks, we've got a strong "Yes," a weak "Yes," a "Maybe," and a "No." All told, we're making progress toward an abatement of foreign headwinds, but I think we have a ways to go. And now Nellie will continue our presentation.

MS. LIANG.[5] Thank you, Steve. I'll be referring to materials titled "Financial Stability Developments."

In our current assessment, we view that leverage and maturity transformation in the financial sector are subdued relative to historical levels, and aggregate private nonfinancial sector credit is modest. These indicators suggest a financial system that is pretty resilient, consistent with not having observed significant funding stresses or margin calls earlier this year when risky asset prices fell and volatility rose sharply. Since then, prices of risky assets have rebounded notably, valuation pressures have risen somewhat, and term premiums remain very low, though higher than in early 2013. And, in terms of risks to financial stability that reflect both vulnerabilities and shocks, the underlying sources for many of the recent shocks have not changed materially, as discussed by Steve and Simon earlier, which suggests volatility could flare up again.

Starting with your first exhibit and now considering asset valuations, the forward P/E ratio for the S&P 500 in the top-left panel has moved back up, as stock prices have risen sharply since mid-February while earnings have been marked down notably. The forward P/E for stocks is at about the 80th percentile, suggesting somewhat stretched valuations, and the VIX, the implied volatility, not shown, has dropped to multiyear lows. As shown to the right, the high-yield bond spread has narrowed but remains on the wide side for a nonrecessionary period, reflecting concerns that corporate credit quality has shown signs of some deterioration, even outside the energy sector. The level also reflects somewhat wide risk premiums, as measured by the far-term forward spread, the green line.

In commercial real estate, capitalization rates for all property types are at or near their historic lows. As detailed in a staff memo on the CRE market, valuation pressures are notable, but credit levels remain moderate, and recent robust growth may slow, as terms and standards have tightened. Under a stress scenario with a sharp decline in prices, we expect losses to be felt most keenly at smaller community banks, as larger banks are more diversified and have been stressed for such a scenario, and the financing of CMBS currently does not appear to be highly levered. Overall, our assessment is that this market does not currently raise broad financial

[5] The materials used by Ms. Liang are appended to this transcript (appendix 5).

stability concerns, but downside risks would become more substantial if credit growth or leveraged CMBS positions were to pick up.

Moving to the right, the black line is a summary quantitative measure of risk appetite back to 1975 that is in the spirit of the quantitative indicators we started showing last year. This measure reflects risk premiums and lending standards across four asset classes: residential mortgages, business credit, commercial real estate, and equity markets. Because it was designed to provide consistent metrics over a reasonably long period, it does not fully capture trends for some financial innovations, such as the junk bond market and securitization. It is shown as a percentile, with a reading of 100 corresponding to the maximum, 0 for the minimum, and 50 for the median. The Q1 estimate is near the median, down a bit from last fall, consistent with our assessment that valuation pressures have eased.

The blue dashed line in the chart plots the number of asset classes whose valuation metric is ½ standard deviation above its historical mean since 1975. It varies between 0, when none of the four components are elevated, and 4, when all four are elevated. The Q1 estimate shows that only one of the four categories, the commercial real estate market, is notably high. If we assumed the current stock price and volatility measures held through Q2, all else being equal, the equity market would also be elevated. Looking back, it is not unusual for risk appetite to be high in one or two asset classes, but it is unusual for three or four to be high at the same time. This configuration occurred consistently between 2005 and early 2007, when the risk appetite measure was close to its maximum of 100. The insight is that when this measure peaked, it was because risk premiums and lending standards were unusually accommodative across all four asset classes, not just because house prices were high. This measure might be useful for gauging systemic concerns, as it reflects both the level and the correlation of high risk appetite across different asset classes.

In ongoing research, positive impulses to this measure in a vector autoregression framework are, not surprisingly, expansionary for the economy in the near term, as higher values reflect more favorable conditions. However, we find a similar impetus also leads to a rise in the private nonfinancial credit-to-GDP gap over a longer horizon, starting with about a four-quarter lag, suggesting a buildup in vulnerability if the gap is already high. High credit-to-GDP gaps, measured relative to a long-term trend, have been found in cross-country studies to be a robust indicator of recessions, and this measure has been supported by Basel for setting the level of the countercyclical capital buffer. The relationship between risk appetite and future credit gaps provides a reason for keeping an eye on asset valuations.

As shown in the bottom left, the private nonfinancial credit-to-GDP gap at the end of 2015 is still below its estimated longer-term trend, though there is uncertainty about what is an appropriate trend line. As shown to the right, the gap differs notably for corporate businesses, the red line, and households, the blue. The very large negative gap for households raises the question of whether all of the current gap is cyclical.

With regard to the financial sector, considered in exhibit 2, leverage appears modest, and risk transformations of various types, as best we can tell, appear low relative to recent history amid ongoing structural reforms. As shown in the top left, stock prices of the large domestic LISCC firms fell especially sharply in January and February on negative earnings news related to concerns about falling oil prices, risks to economic growth and negative interest rates, and the health of some foreign banks. CDS for these firms, the black line, rose but have since fallen back to fairly low levels. Price-to-book ratios, shown to the right, the orange bar, currently are lower than at the end of 2015, the blue bar, and 2014, the red. We interpret the price-to-book ratios that have persisted below 1 for a few firms for a while as reflecting concerns for earnings prospects and longer-term shareholder returns, rather than immediate solvency concerns.

The middle-left panel provides a high-level overview of credit provision by domestic financial intermediaries, as measured by their holdings of loans and bonds to the nonfinancial sector. While the credit market debt-to-GDP ratio has risen substantially in recent decades, bank credit, the dark blue, has been roughly steady. Of course, banks are more important to the financial system than suggested by this share, as they provide backup lines, originate and warehouse loans for securitization, provide financing in various forms to investors, or enable hedging as derivative counterparties. Still, the chart emphasizes that there's much to pay attention to outside the banking sector to assess resilience.

Looking back, the strongest growth in credit provision by other intermediaries leading up to the financial crisis was at the GSEs, the light blue, and at ABS issuers, the red shaded area. Recently, ABS issuance has been fairly modest. As noted to the right, new rules have been adopted that require risk retention and greater disclosure, which should improve the stability of these structures.

Looking back at the chart, as shown by the orange, long-term mutual funds have about doubled since the crisis. This growth could be stability enhancing as more credit is provided by less-leveraged entities, although in recent years there's been rapid growth of some mutual funds that use derivatives heavily and of bond and loan funds that hold less-liquid assets while offering daily redemptions. The Financial Stability Oversight Council issued a statement last week, and as noted to the right, for money fund leverage, they supported recent SEC proposals for more data reporting and disclosure, more robust risk-management practices, and limits on leverage through derivatives. In addition, to reduce liquidity and redemption risk, the council indicated steps should be considered to strengthen funds' risk-management practices to account for broad market stress, increase clarity about the limits for permissible less-liquid asset holdings, and facilitate the use of tools to reduce first-mover advantages.

The recent growth of bond mutual funds holding less-liquid assets raises concerns about the resilience of market liquidity if widespread redemptions were to force sales. We recently looked at bonds of oil companies, as an example, of bonds under stress, and our assessment is that trading in the secondary corporate bond market functioned

pretty well in recent months. As shown in the bottom left, trading volumes for oil bonds have trended up since 2014 and did not dry up in recent months. Bid-asked spreads for oil bonds, the red line in the right panel, also rose by more than for non-oil bonds, the blue line, but increases in bid-asks are not unexpected, as dealers require higher compensation for more volatile prices. We also didn't hear from market participants of serious increased difficulties in executing transactions. Even so, as we do not capture trades that do not get completed and adjustments to market-making models continue, we will want to stay attentive to whether market liquidity is sufficiently resilient to stress.

Thank you. That concludes our prepared remarks. We'd be happy to respond to your questions.

CHAIR YELLEN. Are there questions for any of the briefers? Governor Tarullo.

MR. TARULLO. Thank you, Madam Chair. Steve referred to markets as largely having shrugged off Brexit risks. This is consonant with what I've heard directly from some market actors. But Simon, in his presentation, noted a fairly significant increase in demand for protection against pound depreciation against the dollar, apparently with an eye toward the upcoming referendum. How do I reconcile those two observations?

MR. KAMIN. Right. I will say that I pondered whether I should use that phrase, and I received support from my colleagues to do so, with one exception, which is in FX markets.

MR. TARULLO. Okay.

MR. KAMIN. In FX markets, they expect that the bad vote—that is, to leave—would indeed push down the pound.

MR. POTTER. But it might be the right thing to happen. If they leave, maybe the pound has to depreciate because that's the right pricing response.

MR. TARULLO. So that's what I was going to ask—whether that suggested markets were thinking that the medium-term economic prospects of the United Kingdom don't look so great with Brexit. But there aren't as many immediate financial-stability-type concerns—that is, funding of the banks and things like that.

MR. POTTER. Possibly, but there's a wide bid-ask on where the sterling might end up on June 24. The event risk is big.

MR. FISCHER. Hasn't there been a substantial depreciation of the pound sterling?

MR. POTTER. There has been a substantial depreciation leading into this.

MR. KAMIN. Well, in recent months, it's more that it has not risen against the dollar as much as other currencies.

VICE CHAIRMAN DUDLEY. Well, it's pricing in some probability of Brexit.

MR. KAMIN. Yes. Exactly.

MR. POTTER. It got down to about 140.

VICE CHAIRMAN DUDLEY. And so it's declined, and if the vote is to stay, the pound will likely rally. And if the vote is to leave, the pound will probably slough a lot. And, currently, it reflects some weighted average of those two outcomes.

MR. KAMIN. But I've heard no comments to the effect of, well, it might lower the pound, but it would not have other adverse effects. I think a lot of market observers expect that if there was a leave vote, it could create disruptive ramifications. And it's a bit of a mystery as to why it has not affected other markets much.

MR. TARULLO. Yes. I guess that was the question I was asking.

VICE CHAIRMAN DUDLEY. It doesn't seem to be priced into other European markets, in which people think that there could be some ramifications.

MR. POTTER. So the cost of protecting in other markets against it has not risen as much. That could be because there's no spillover, or it could be mispriced. We don't know.

MR. TARULLO. But even if you hypothesize, Simon, that the overnight change in the pound would be much bigger than is anticipated by the hedging that has taken place to date, and,

therefore, there could be some effects on, for example, British financial institutions, shouldn't that be reflected in at least some increase in funding costs for those institutions now?

MR. KAMIN. Right, if it were considered material. In fact, funding spreads in Britain have gone up about 5 basis points, so not very much.

MR. TARULLO. So they believe the polls right now, basically.

MR. POTTER. But you have to be a little bit careful. The Bank of England has said that it will supply liquidity and it will put in extra auctions, so we don't know whether that is reducing the affect. I think CDS for large U.K. banks might have moved up a little bit since last year.

MR. KAMIN. They have moved up, but not very much.

MR. TARULLO. Yes.

CHAIR YELLEN. President Bullard.

MR. BULLARD. Thank you, Madam Chair. Just to follow up on this, I thought that even if they voted to get out, this would trigger a round of negotiations. Even for financial institutions, at least immediately, their situations would not change for up to two years. And beyond that, it's not that clear exactly what their situation would be. So the market might price in only a small change for Brexit.

VICE CHAIRMAN DUDLEY. But it wouldn't be a good outcome for the U.K. economy, because there would be tremendous uncertainty over that period.

MR. BULLARD. All true. But this is just a reason why markets might say, "Well, I'm not sure how to price Barclays."

MR. KAMIN. I think the thinking underlying the adverse ramifications for a leave vote would be that, after the vote to leave, they'd then start a negotiation period that could be two

years or longer, and that the uncertainty over the model of U.K. linkage to the European economy that would result from that would be sufficient to put a lot of downdrafts both in markets and in real-side spending and confidence.

MR. BULLARD. Certainly true. But my only point would be that's a very slow-moving process. We've got negotiations going on all over the world all the time.

MR. POTTER. But there are capital inflows the United Kingdom relies on, and Governor Carney in particular has pointed that out as a potential strain.

MR. BULLARD. Absolutely.

CHAIR YELLEN. Further questions? President Williams.

MR. WILLIAMS. So this is for Bill Wascher. Ready? Okay. [Laughter] It's no surprise I'm going to revisit a topic. As Governor Powell and I noted at our March meeting, productivity growth has been surprisingly bad for the past five years, averaging about ½ percent. Tealbook puts it at minus 2.2 percent in the first quarter. It's a huge negative. Yet in the Tealbook forecast, productivity growth pops back up to 2 percent in the current quarter and stays strong for the rest of the year. So my question, as it was in March: What makes you continue to expect that we are on the verge of this extraordinary reversal in productivity growth? I'm usually accused of being optimistic.

MR. WASCHER. Some of the pickup reflects a technical issue with hours. I hate to bring this up, but we've been surprised on the upside by the strength in the component of hours that isn't captured by the payroll survey, and that's been holding productivity down. We don't project it being wound back, but we aren't expecting it to continue, and we get a pickup in productivity growth on that technical reason. More broadly, our view is that as the economy improves and investment picks up, we'll start to see some gradual improvement in

productivity—only to, maybe, 1¼ percent, so it's certainly not high relative to the post-2005 era. In fact, I think the average over that 10-year period is about 1¼ percent. So we're not expecting a huge pickup in productivity.

I guess the other thing I would say is that we're also nervous about it, and we see downside risks. There was an alternative view box in the Tealbook that I thought made a strong case that we might not see a pickup like we have in the forecast. And along with that alternative view box, we included a couple of alternative simulations that illustrate how the economy might respond to a weaker productivity path. So in the baseline forecast, we have retained our assumption that productivity will move back up to a modest 1¼ percent pace, but I certainly agree that there are downside risks to that, in light of what we've seen over the past five years.

MR. WILLIAMS. Okay. Thank you very much.

CHAIR YELLEN. Vice Chairman.

VICE CHAIRMAN DUDLEY. I have a question for Nellie. On your exhibit 1, the chart on the lower right, the corporate business sector looks like it might be overextended. Does it matter if the corporate business credit-to-GDP is going up because they're voluntarily changing their capital structure by buying back shares, as opposed to going off on some sort of investment spending binge?

I don't know the answer myself. I'm just wondering what your thoughts are on that, because it seems that what's happening in the corporate sector is, people have looked at the cost of credit, they've decided the optimal capital structure is different from what it was before, and they've moved to that different capital structure.

MS. LIANG. What we can try to look at is, what underwriting standards look like, as opposed to how well they're using the funds they raise. This chart reflects the concern we have

raised since 2013: the rise in debt in the high-yield bond market and the leveraged loans, in which we had been starting to see very loose underwriting standards. I think at this point, with oil prices having fallen and credit growth in the sector having really started to slow, though there are a few defaults, there's some easing of imbalances. Our sense is, this debt ratio won't continue to rise. But it has risen, and at this point is that the divergence with household is quite unusual.

VICE CHAIRMAN DUDLEY. Because profits are actually pretty high relative to their past levels.

MS. LIANG. The earnings per share growth estimates are coming down.

VICE CHAIRMAN DUDLEY. Okay. Thank you.

CHAIR YELLEN. President Bullard.

MR. BULLARD. Thank you, Madam Chair. I have a question for Bill Wascher. Looking at the forecast summary, chart 3, real GDP, how should I interpret the confidence bounds there? You've got a confidence interval that is a 70 percent confidence interval and the March Tealbook looks like it was outside the confidence interval for first-quarter GDP. Is that how I should interpret this? That sounds like we got extraordinarily bad news during the interim, which couldn't have happened on the basis of historical forecast errors. That's how I would interpret this figure.

MR. RUDD. So, President Bullard, if I may—

MR. BULLARD. Yes.

MR. RUDD. We would have started the confidence interval earlier last round because we would have put it around our forecast, so when the confidence interval would have expanded

last round, it would have been maybe two quarters earlier. So the March forecast wasn't outside the March confidence interval.

MR. BULLARD. Yes.

MR. WASCHER. But nonetheless, Q1 was surprisingly weak. I don't know how it would have compared to the confidence interval in March because we don't have that, but it was a pretty big downward revision to our estimate.

MR. BULLARD. I see. So if I put the two-step-ahead confidence bound mentally around the red line, I would get inside the black line.

MR. WASCHER. Yes, maybe that would give you a better sense.

MR. RUDD. So even if you look closely, I think that you might be slightly outside it and that the Q1 confidence interval last round was probably ¾ percent on the low end. As Bill said, it's something we weren't expecting, and it was unexpectedly large.

MR. BULLARD. You know, it would be interesting to me if you could provide in future meetings a kind of index of how surprising the news was in between meetings from the perspective of real GDP. Maybe you do that in other places.

MR. POTTER. Didn't you have a box in the Tealbook?

MR. WASCHER. That's just a retrospective of forecasters going back, but that's not about a particular quarter.

MR. BULLARD. Because it's kind of informative to say, "Well, the news was pretty bad" or "kind of bad" or "about what we expected."

MR. WASCHER. Okay.

MR. WILCOX. Isn't that what this confidence interval does?

MR. BULLARD. Well, evidently, not quite, because the interval around the red line would be actually bigger if you put that on this chart.

CHAIR YELLEN. Thank you. Any other questions? [No response] Then we have an opportunity now to comment on financial stability, and I have four people who have indicated a desire to do so. Let me start with President Rosengren.

MR. ROSENGREN. Thank you, Madam Chair. I appreciate the staff's report and the comprehensive discussion of emerging risks in commercial real estate, including possible actions that could be taken. In fact, this discussion is not unlike the discussion of emerging risks in the COP financial-stability tabletop exercise that was prepared roughly a year ago. Unfortunately, one of the most serious concerns in that tabletop exercise was a continued rise in commercial real estate prices and a relatively low interest rate environment. Since the tabletop, commercial real estate prices over the past year have tracked the simulation quite closely. Over the past seven years, multifamily commercial real estate prices have roughly doubled, with the prices of other categories of real estate also rising quite rapidly, as was shown in the QS report. Commercial real estate is a significant asset class for many leveraged intermediaries, and thus a quick price reversal could have serious repercussions. I personally witnessed this in New England when a significant percentage of banks failed or were deeply troubled as a result of falling commercial real estate prices in the late 1980s, with significant spillovers to the broader economy.

Starting with this morning's conversation, many people have suggested that if confronted with a buildup in financial stability risks, we should use supervisory and macroprudential tools as our first line of defense. I agree. The challenge is finding the appropriate tool and calibration of that tool for such a response.

The commercial real estate presentation illustrates the challenge quite well. Many of the high-price commercial real estate properties in Boston are supported by financing from a mix of large banks, many of which are foreign banks, foreign investors, and large nonbank intermediaries. However, large domestic banks still maintain a relatively modest overall exposure to commercial real estate. Smaller domestic banks with assets in the $1 billion to $10 billion range have significant exposure to commercial real estate in small multifamily and strip mall projects, but these are banking organizations with respect to which we traditionally have a relatively light supervisory touch, unless the banks are state member banks.

If we believe that exuberance in commercial real estate risks a more significant reversal of price and thus raises safety and soundness concerns for these medium-sized banks, we can address these concerns with traditional tools. In particular, the 2006 real estate guidance, which was greatly watered down from its original formulation, could be strengthened. That guidance could revisit the multifamily concentrations and consider more-binding thresholds of a kind similar to what had been done with leveraged lending. In addition, we could announce increased frequency of exams and more-thorough holding company exams for those banks and holding companies already outside the parameters of the current guidance.

Although strengthening the guidance will likely require perhaps torturous interactions with our fellow supervisors, the likely long delays in this process suggest that we should start the process relatively soon. Increasing the depth and frequency of holding company exams would send a strong signal of our concern. More-aggressive examinations would also have costs, as they would require significantly more resources than we have budgeted and would likely be viewed unfavorably by other regulators unless the primary regulator was also involved. Nevertheless, I think we should be considering these measures.

In the case of the larger banks, the concern is less a supervisory one, as the overall exposures are relatively low, than a financial-stability one. In this case, the emphasis is on both signaling our concern and increasing the resiliency of the banking system to withstand a widespread price decline that causes collateral damage beyond that of the direct commercial real estate exposure. One way to signal our concern and perhaps increase resiliency via additional capital buffering is to increase a more severe stress scenario in the CCAR exercise. This in effect raises the cost of capital for large banks making commercial real estate loans, which has the benefit of providing large banks an incentive to reduce the risk through their direct exposure. I think we should consider this for the next CCAR. In addition, I view the rapid increase in commercial real estate prices as a sign of increased risk tolerance and possibly "reaching-for-yield" behavior. Although the countercyclical capital buffer is a blunt instrument, it has the virtue of building more resilience into banks should a CRE crash occur. I would consider increasing the buffer, which is currently at zero, to reflect the increased risk to financial stability, with commercial real estate highlighted as key evidence of that risk.

What happens if nothing on the supervisory or macroprudential side is done? I hope that's not the case, and that regulatory agencies begin to take increasing actions in response to this risk. The policy tools are vested in a variety of regulatory agencies, including the FSOC, the Board of Governors, and the other regulatory agencies, but not the FOMC. Due to the cumbersome governance in the United States, many of these changes would require long lags in implementation. In that case, were the risk to increase and no actions taken, I would be inclined to consider monetary policy tools, including more quickly shrinking our balance sheet or raising interest rates more quickly than we otherwise would, and highlighting through our formal

communications that this, in part, reflects some of our financial stability concerns. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Brainard.

MS. BRAINARD. Thank you, Madam Chair. I think this QS presentation that Nellie made is a good opportunity to make the connection back to this morning's conversation.

Looking at the volatile market conditions at the outset of the year, they provided a bit of a stress test that helped inform the QS assessment this quarter. It was notable that U.S. financial firms and markets came through the elevated volatility in January and early February looking relatively resilient. This highlights the critical importance of the buffers that have been built since the crisis in the banking system in response to the substantially tougher regulatory framework and heightened supervisory expectations.

In addition, I thought it was interesting that the relatively smooth functioning of the corporate bond market in the face of very sharp increases in spreads was a particular focus, in light of ongoing concerns about liquidity transformation in mutual funds concentrated in the relatively illiquid assets in this sector, which have been highlighted by the FSOC. The volatility underscores the importance of the reforms the SEC is proposing to ensure proper stress testing and that liquidity is well managed and available in anticipation of redemption surges as well as limits on leverage through derivatives.

The other dimension that I thought deserved particular attention, as President Rosengren had mentioned, is the particular focus on valuation pressures in commercial real estate, in which there's been rapid growth in lending, particularly in the multifamily segment and in which underwriting standards have been weakening and capitalization rates have been falling. I think the discussions that we've had at the Board have very much emphasized the importance of

ensuring that banks are vigilant to the risks associated with possible price declines in this segment of lending as well as interest rate increases. The Board is undertaking or assessing a variety of actions in this arena, including the incorporation of these risks into CCAR scenarios and reinforcement of the guidance on CRE concentrations.

One of the conclusions that was important in the work that was done by the QS staff is that a lot of the concentration sits in small banks, though they view it more as a microprudential than a macroprudential risk. One of the interesting analyses that they shared was the potential value to top-down stress testing to help identify vulnerabilities in small banks and potentially help supervisory guidance, particularly when those vulnerabilities don’t correspond to higher CRE concentrations and thus would not have been caught necessarily by the concentration guidance.

The conclusion I draw is simply that this framework and this QS is working, I think, the way that we would want it to work, and that insofar as the QS assessment called out risks to financial stability more generally that they believed would be best addressed by monetary policy, this would be precisely the kind of presentation that would help us move in that direction on the basis of the kind of framework that we talked about this morning. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Fischer.

MR. FISCHER. Nellie, I wanted to try to draw out an example in which we moved from assessment to actually doing something, which is leveraged lending. What was it that went from recognizing the problem to getting out warnings out about it, actually warnings that seem to have been heeded? How did that all work?

MS. LIANG. So this was, I would say, probably in 2013.

MR. FISCHER. No, it was after 2013, because I remember it.

MS. LIANG. Yes, well, it was 2011 when we started. High-yield bond spreads were reaching near-historical lows, and we were seeing a weakening of underwriting standards in that sector. Many of these transactions, like M&A transactions, require some combination of leveraged loans and high-yield bonds. In the leveraged loan sector, we were seeing debt multiples rise pretty quickly, above six times—which is pretty high by historical standards, in terms of what is going to be repaid at some point. So we were looking at both prices and standards and then debt growth for these loans that was starting to rise at an annual rate of somewhere between 10 to 15 percent a year. At that point, there was some discussion of whether the banks were doing the underwriting of the leveraged loans and were they holding them. That was the first discussion. Would they be bearing future losses? And, for the most part, while they were originating them, they were not holding them. So there was just a lot of communication about this issue in the beginning.

I think there's a little history on the leveraged loans. We actually wanted to start an update of the guidance in 2008, but by then the crisis had sort of started, so it was a little too late to get this guidance out. And so it had kind of started on its own, and this was a timely way to get it out. So, I think, just by the metrics we look at, we're seeing that the debt of the underlying firms that were issuing the high-yield bonds and the leveraged loans also was rising quickly. That combination suggested starting with communications.

MR. FISCHER. And was there interaction with the supervisors as well?

MS. LIANG. Oh, absolutely.

MR. FISCHER. Yes. And Eric has talked about the commercial real estate capitalization rates. On that or on anything else that's in here, are there things we should be worrying about and beginning to focus on?

MS. LIANG. I think other than commercial real estate—and there we have done the assessments—we do not think at this point that it's a broad financial stability concern. The debt growth is not as sharp as it was in the high-yield sector or the corporate sector, but in view of these prices and incentives, absent shocks and the economy recovers, this is probably a place in which people will start to try to get credit, commercial real estate exposure. So we would want to be paying attention to that. Right now, as we said, it's a small-bank issue. The large banks have been stressed with pretty severe commercial real estate price declines on the order of 30 percent.

MR. TARULLO. That's in this year's test too, right?

MS. LIANG. That is also in this year's. It was in last year's test, and it is a similar sharp decline this year.

MR. FISCHER. Okay. Thank you.

CHAIR YELLEN. Vice Chairman.

VICE CHAIRMAN DUDLEY. Thank you, Madam Chair. First of all, I really do appreciate all the work that's gone into this QS assessment. I do like the fact that you're doing this topical deep dive into commercial real estate. I think that doing a "deeper dive" on emerging issues should be part of the exercise on an ongoing basis.

I would also encourage the staff to consider exploring other areas in which shocks could potentially emerge. It seems to me that there should be two broad considerations shaping the QS work—one, the likelihood of a large shock, and, two, the potential vulnerabilities of the financial system asset prices should that shock occur. Up to now, it seems like the QS had been more focused on the latter than the former, and I feel, as the process continues to mature, I would very

much welcome a more forward-looking examination of the likelihood of large shocks emerging from various sectors of the economy.

I have to say, when we're talking about commercial real estate, I guess I'm a little bit less concerned about that, because it seems to me that this is really not about commercial real estate being dramatically overvalued—it's really about the U.S. Treasury market being really overvalued. And then, if you look at the spread of the cap rates relative to U.S. Treasury securities, it doesn't look that outlandish. It's similar to the U.S. equity market. The forward P/E ratio of the equity market looks elevated, but why is that? It's because the Treasury market is at such a low-level yield. If you look at the equity risk premium, it doesn't look particularly out of whack. So it seems to me, when I follow the threads, it all comes back to the U.S. Treasury market, and that all comes back to us, because we deliberately pursued QE, which depressed term risk premiums. So, you know, to quote Pogo—"the enemy is us," in some sense.

I think it's really important that we not lose sight of the fact that the Treasury bond market is really an area of significant risk and, I would argue, not so much in the United States, but more so in Japan and Europe. I keep thinking about, if the Japanese actually succeed in their aim to push inflation back to their objective, that implies a very, very large adjustment in JGB yields, and the same thing would be true in Europe as well. So I think we should just keep that in mind.

I briefly want to touch on three other issues: Puerto Rico, an old favorite; Brexit; and the potential consequences of the view that some countries may be reaching their limits of monetary policy. With respect to Puerto Rico, the situation continues to go downhill. We still have a race going on between a hard, disorderly default due to lack of a good bankruptcy mechanism and

congressional legislation that might provide such a regime, which could facilitate an orderly restructuring of the island's debt burden.

In recent weeks, the government has placed restrictions on the use of government development bank deposits. In response, we at the New York Federal Reserve have closed our account with the GDB. The good news is that this was anticipated. We told them we were going to have to do this, and the bulk of the payment accounts were transferred from us to banks on the island, so there's been very minimal disruption to payment activity. The other piece of good news is that our closure of the GDB account has not gotten much attention in the press, nor has it appeared to provoke greater instability. So that's the good news.

The bad news is that, on May 1, the GDB faces a large debt obligation that it's highly unlikely to have the funds to meet, and on July 1, the government will be in the same situation with respect to sovereign debt. So unless viable congressional legislation arrives relatively quickly, this situation could go downhill very, very fast.

One area of particular vulnerability is that of the "cooperativas." The cooperativas are credit unions on the island that provide a significant amount of banking and deposit services to island residents. This is not a great situation. They don't have much capital. They have significant Puerto Rican sovereign debt exposure. The entity that ensures their deposits has very little in the way of resources, and the government lacks the fiscal capacity to backstop this sector. So the risk of a deposit run on the cooperativas is very real. We're monitoring the situation very carefully. We don't see anything yet, which is the good news, but, you know, you ask yourself in this situation, when do you get deposit runs? This is probably pretty high up on your list.

In terms of the Congress and the Administration, I think the issue is, are they going to get to legislation? And is the legislation actually going to be workable, in terms of providing for an

orderly bankruptcy? As I've said many times before, the Puerto Rico situation is absolutely horrible for the people of Puerto Rico. People are leaving the island. The economy is contracting. But the contagion risk back to the U.S. mainland seems to be very, very limited, and that hasn't changed.

On Brexit, we talked a bit about the issue for the British, if they were to vote to exit. I do think, though, that that is priced into markets, as Simon noted. But there are two other issues. If Britain were to vote to leave, I think there really would be a risk of contagion to Europe, because I think Brexit could be conceivably viewed as another shoe to drop on the road to European Union disintegration, and that's not priced into markets. I think the degree of contagion that might occur there is highly uncertain. I also think that if there was a Brexit vote to exit—I think that PredictIt.org yesterday had it as 29 percent probability—it could lead to a generalized risk-off sentiment. You know, we've gone from risk-on to risk-off to risk-on. We could go back to risk-off very, very quickly. And if we saw that, I think we'd see quite a bit of turbulence in the foreign exchange markets and tighter global financial market conditions.

One key issue here is, what would happen to the Japanese yen? If there really was a wholesale movement to the Japanese yen, how would the Japanese authorities react, and what would the tolerance of the rest of the G-20 be for Japanese foreign exchange intervention? So that's another important wildcard to consider. This could all go downhill very, very quickly, depending on how this unfolds.

The third issue I want to mention briefly is the risk we could go back—and this is going to be channeling Steve a little bit—to the darker days of January and early February should the global economic outlook disappoint. I generally agree with how you summed it up in terms of "Yes," "Yes," "Maybe," and "No." But it seems to me that one important support for the global

economic outlook is this notion that countries have the monetary policy and fiscal capacity to respond if they're hit with adverse shocks. And I think that the rather unhappy experience with negative interest rates is a cause for concern, at least for me, because I think households and businesses judge the capacity for an effective response as having diminished. If you were hit with a shock, sentiment could turn much more sharply in a negative direction very, very quickly. So you could end up in this feedback loop of deteriorating confidence and deteriorating financial conditions with the central banks not having a lot of credible ammunition to use to offset this.

So I think it's good that financial conditions have recovered nicely over the past few months, but I still feel there's some underlying fragility there that, at least for me, suggests that the risks still remain skewed somewhat to the downside. Thank you, Madam Chair.

CHAIR YELLEN. Governor Fischer.

MR. FISCHER. Bill, how sure are you that this is anything but a banker's attempt to prevent negative real interest rates? And you said the loss of confidence. Where is the loss of confidence coming from? From the guys who don't want this?

VICE CHAIRMAN DUDLEY. No. I'm not so much focused on the bankers not liking negative interest rates because of the pressure on their net interest margins. I'm more focused on the fact that I think households in particular view this as sort of a scary regime. My own personal opinion is that there's a subtle confidence channel here, that an environment in which you have to pay to hold cash in a bank is sort of unnerving. I can't prove that there's that channel, but it certainly seems to me that the general reaction to negative interest rates in Europe and Japan has been more negative than what people anticipated.

MR. FISCHER. Well, but if you look at it more closely, you'll see that the reaction came largely from Germany and from whatever is going on in Japan, which I don't understand. The

ECB has sort of turned back a little bit from its statement that this won't work if we have to go further. The Swedes, to whom we listened at great length during the IMF meeting, are very happy with what they've got and believe they can do more. So I don't think we're at the end of negative rates.

VICE CHAIRMAN DUDLEY. We may not be at the end, but I'm talking about people's perception that there's a diminishing margin of monetary policy in the toolkit, that's all. Because you saw in January and early February that the swing in sentiment was really powerfully negative, and I think that was part of what was driving it. That's just my personal opinion. I hope I'm totally wrong.

CHAIR YELLEN. Okay. I suggest we take a 15-minute break. We'll will get some coffee, and then we'll start our economic go-round.

[Coffee break]

CHAIR YELLEN. Okay, folks, let's resume. I think we can now begin our economic go-round. And our first speaker is President Williams.

MR. WILLIAMS. Thank you, Madam Chair. My positive outlook for the economy remains essentially unchanged since our previous meeting. Better financial conditions and robust job growth have offset some disappointing spending data. Overall, I expect 2016 to look a lot like 2015, with about 2 percent real GDP growth, sizable job gains, and a gradual decline in the unemployment rate. I expect underlying measures of inflation to make the final few steps to our 2 percent goal over the next few years.

As we discussed already today, I see the risks to the outlook as having come down a bit. I'll mention one in particular. I was concerned about the high degree of uncertainty that was holding back, potentially, employment and investment regarding "Deflategate" and how that

would be resolved. [Laughter] But now that the courts have finally resolved that issue to everyone's satisfaction, I think that uncertainty has also stepped down. So, overall, I see the risks to the outlook as roughly in balance.

Of course, it's that time of year when we all get together to discuss residual seasonality. [Laughter] First-quarter dips in real GDP growth have become the norm. In the past, these weak first quarters have been followed by systematically stronger GDP growth later in the year, and so they provided little signal about the underlying momentum of the economy. One underlying problem is that the BEA uses a bottom-up methodology, which seasonally adjusts the individual subcomponents of GDP instead of the aggregate number directly, and this approach allows small amounts of seasonal variation at a granular level when aggregated to affect the top-line numbers. So, to correct this problem, my trusty staff took a top-down approach and applied a second round of seasonal adjustment to the published aggregates, and they estimate that real GDP after this second round of seasonal adjustment increased at a rate of more than 2 percent in the first quarter. The higher number is better aligned with the strong labor market readings and is more consistent with my business contacts who report no recent drop-off in activity.

The residual seasonality also reflects the PCE inflation data but to a much lesser extent, and it can be sidestepped by focusing on year-over-year comparisons. The Tealbook indicates that core PCE inflation rose 1.6 percent from the first quarter of last year to the first quarter of this year, and that's a jump of 0.3 percentage point from where it was a year ago. A big part of this step-up reflects the dissipation of transitory factors that were holding core inflation down. One notable example is the acceleration of prices for health-care services. Medicaid physician payments were cut on a one-off basis in January 2015, something I mentioned last year, and that lowered health-care inflation and held down year-over-year aggregate core PCE inflation by a

couple of tenths throughout last year. Now that we've moved out of that 12-month window, price inflation for health-care services has been resuscitated, if you will, and it is again adding to core PCE inflation. Unlike the Tealbook, I assume the increases in year-over-year inflation will not be unwound and continue to expect inflation to steadily move back toward our target of 2 percent over the next few years.

In the labor market, there's little doubt that things are good. A wide range of labor market indicators, such as initial claims for unemployment insurance, job openings, quits rates, and perceptions of job availability and hiring difficulties, all point to a labor market at full employment. Even labor force participation has rebounded, driven by inflow of workers ages 25 to 54 who are taking advantage of the strong job market.

One discordant note in the otherwise strong labor market is the elevated number of long-term unemployed—that is, those who have been looking for a job for at least six months. A number of studies have raised the possibility that this increase in long-term unemployment reflects particular characteristics of the long-term unemployed, such as outmoded or depreciated skills, and that these challenges may have persisted well into the recovery. To investigate this hypothesis, my staff examined the underlying microdata to see why so many long-term unemployed have failed to escape either by finding a job or exiting the labor force. This investigation finds that during the recession, job-finding rates declined uniformly for all types of unemployed individuals, suggesting, at least on that basis, that the long-term unemployed aren't unique in that regard. At the same time, the composition of unemployment also shifted toward individuals with a relatively low propensity to leave the labor force—for example, older workers who permanently lost their long-standing jobs. These two patterns in combination boosted the share of workers who moved into long-term unemployment. That is, the growing pool of long-

term unemployed are primarily job seekers who are dedicated to staying in the labor force and are actively looking for jobs but are finding it difficult to land one. They don't appear to be individuals who have mismatched skills or other unfavorable characteristics. In other words, from the perspective of our maximum-employment mandate, the long-term unemployed should be counted equally with the rest of the unemployed, and the overall unemployment rate remains a good summary measure of the health of the labor market.

So what should we expect regarding the long-term unemployment rate? My staff constructed a simulation of unemployment dynamics that incorporates unemployment escape rates for the various groups of the short- and long-term unemployed. Their analysis suggests that the current elevated long-term unemployment rate reflects longer-term trends in the composition of the labor force and is not a sign of anything unusual in the labor market at this time. These trends include demographic factors such as the aging workforce and the high labor force attachment of women—that is, the higher share of long-term unemployed is just part of the "new normal."

Finally, I appreciated the Tealbook alternative view box on the outlook for productivity growth. We've been repeatedly surprised by weak productivity growth for the past five years, and if productivity growth doesn't rebound sharply this year as assumed in the Tealbook, then the alternative scenario—consisting of weaker labor productivity and a stronger labor market—becomes a more likely outcome. In that scenario, unemployment falls below 4 percent, and we overshoot our inflation goal. As I mentioned last time, this is one of the prominent upside risks to the achievement of our goals that I see as balancing the downside risk arising from abroad. Thanks.

CHAIR YELLEN. Thank you. President Lacker.

MR. LACKER. Thank you, Madam Chair. Economic conditions in the Fifth District have strengthened in recent weeks. We're hearing uniformly positive reports from our District contacts, with the exception of those in the coal country of southern West Virginia, and our survey results have been strong as well. Our manufacturing index popped up to 22 in March after a long stretch of neutral readings. The April results, which were released this morning, remained strong. The composite index was 14, and the new orders index was 18. Our services survey, which also rose in March, strengthened further to 15 in April. The retail component remained exceptionally strong at 37, with sharper traffic in big-ticket sales registering large gains. The wage indexes remained solidly positive in all our survey sectors.

For the national economy, the incoming data did not change my assessment since our previous meeting or, for that matter, since December. Financial market turbulence has subsided, and downside risks to U.S. economic growth look to me to have returned to about where they were four months ago. I continue to expect real GDP growth of about 2 percent for the next year or two.

I agree with the Tealbook that there's no slack left in labor markets, and measures of unemployment and labor force participation indicate essentially full utilization of labor resources. So we are as close to our maximum-employment objective as one could hope for. In the near term, I expect employment growth to continue to outpace growth in the working-age population. In other words, I think we're going to reach a state of "overutilization of labor market resources," a phrase I hope to see us use with as much diligence as we used the phrase "underutilization of labor market resources."

In the past, some have argued that labor market resources are underutilized because otherwise we would be seeing increasing nominal wage growth, but I think it is now clearly

visible in the data. While some wage measures, such as average hourly earnings or median earnings growth, have firmed somewhat, other measures from the household survey that filter out composition effects, such as those in the Atlanta Wage Growth Tracker, have accelerated noticeably and are running at a rate of 2½ percent or 3 percent or higher. That might not sound like a lot of growth in nominal wages. But in an environment with low labor productivity growth and low price inflation, it implies meaningful growth in real wages. In fact, over the past three years, real wage growth has outpaced labor productivity growth, and, thus, real unit labor costs and the wage income share have been increasing, which is something we usually observe when labor markets are relatively tight.

There's no question the first-quarter data have come in on the weak side. At this point, though, Q1 looks just like a blip. I agree with President Williams, and I'm impressed by his analysis of the seasonal adjustment problems. In light of the strong labor market and solid readings on consumer sentiment, the dip in consumption growth looks temporary, and I expect healthy consumer spending growth to resume. Residential investment also appears to be on track for strong growth this year. In fact, our local reports suggest that rising construction costs and a shortage of buildable lots are increasingly prevalent. One of our contacts, the CEO of the nation's largest supplier of drywall, reports exceptional year-over-year growth in shipments and describes his firm as positively giddy about its 2016 prospects. Business fixed investment certainly has been soft even before the first quarter, reflecting the effects of the strong dollar, global growth concerns, and a contraction in oil and gas drilling. Looking forward, though, the dollar seems to have peaked, oil prices have stabilized, and the lion's share of cutbacks in oil and gas investment are behind us now. So I agree with the Tealbook's outlook for moderate gains in business fixed investment in the coming quarters.

I'd like to say a word or two about productivity. As the Tealbook points out in its alternative view box and as was discussed today, labor productivity growth has averaged less than ½ percent per year over the past six years, clearly a subpar outcome compared with the period prior to the Great Recession. The staff has been projecting an imminent return to a rate above 1¼ percent for some time—a return that has not materialized—and the Tealbook is quite candid about its forecasting record. In their defense, though, there's a compelling case for expecting a return to more typical productivity growth rates in general, reversion to the mean and all. Nonetheless, as more time elapses with persistently low productivity growth in this expansion, it's natural to place more weight on the possibility that it's going to be depressed for some time to come. Reasonable people can differ on how much more weight, but for me, the past six years have been pretty convincing. So for the near term, I'm inclined to expect a continuation of about the same rate of productivity growth we've seen since 2011.

Together with the fact that the working-age population is expected to grow at about ½ percent per year over the next few years, this suggests we should expect to transition to a new trend growth rate for real GDP of less than 1½ percent. It is true that lower productivity growth is generally associated with lower real interest rates, but I don't think the real economic growth we've been seeing comes anywhere close to justifying the level of real rates we currently have. Furthermore, there's a consensus that labor market slack is gone, and in my view, real GDP and employment growth will exceed trend growth in the near term.

Under current settings of our monetary policy instruments, the outlook for labor markets and output leaves me increasingly confident that inflation will rise this year. Indeed, in recent months we've seen various measures of core inflation rise toward 2 percent, and a broad firming trend now seems evident, notwithstanding the March CPI. This is not to say that inflation is

about to break out immediately and surge above our target, but it does suggest that there are growing risks to the upside that deserve consideration. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Fischer.

MR. FISCHER. Thank you, Madam Chair. We find ourselves and the economy once more in an almost familiar place. In March, we decided to wait on further developments because we were not sure whether it was the first six weeks of this year or the following four weeks that most closely represented the likely state of the economy in the weeks to come.

At this stage, we appear to have returned approximately to the reality to which we have become accustomed for more than a year. The labor market remains strong, perhaps a bit stronger than we had expected, as the labor force participation rate has increased for six months in a row. But GDP growth remains woeful. We can reconcile the behavior of the labor market and that of output by saying that productivity growth is very weak, which it is. But it would be good if we understood why. Those three points are more or less the position to which we were beginning to accustom ourselves at the end of 2015, but now there is an extra factor. Aggregate demand growth seems to have weakened in the first few months of this year. That can be accounted for in a variety of ways by saying there's been a decline in productivity, by noting the decline in the volume of investment, which is both a decline in aggregate demand and a factor reducing productivity growth.

Where are we now before we get into the details of how tough everything is? Well, first, we're very close to full employment. Second, now that oil prices appear to have stabilized and the dollar has stopped depreciating—at least temporarily, perhaps—inflation is higher than it was most of last year, though lower than it was in January. Core inflation is about 1.5 percent, which I regard as being in hailing distance of our target.

The staff has begun to analyze the challenges posed by the slowing of growth. There is, first, the fact that some of what we are seeing may simply be a result of the first-quarter blues, a disease that presents itself for what appears to be a severe slowdown in the first quarter. Data revisions, at least over the past two years, then appear to reduce the reported first-quarter slowdown in the following months but to not totally dispose of it.

Second, in the alternative view box, productivity acceleration will be more gradual, which President Williams just referred to. On pages 22 and 23 of Tealbook A, Tomaz Cajner analyzes the consequence of the possibility that falling job reallocation associated with declining business dynamism appears to be pushing down productivity growth as it had after the year 2000. The concluding paragraph of that box considered what would happen if productivity growth remains historically low for a long time. I quote again: "A protracted productivity slowdown would have much more serious macroeconomic consequences, including continued downward pressure on the equilibrium real interest rate, reduced incentives for labor force participation, rising fiscal imbalances, and slower improvements in living standards." One reaction would be to say, "Well, we know all of that." But knowing all of that doesn't make it any better. Another reaction would be to say that it would be useful to focus on discovering and arguing for productivity-enhancing policies more intensively than we have so far. One doesn't sense—at least I don't sense—that there is a very active debate going on about what we need to do to get productivity to grow more rapidly.

Well, not all that has happened since the beginning of the year is bad. Foreign growth, especially in Canada but also in the euro zone, will probably be higher than it was last year. The Chinese government has decided to try to maintain economic growth near 7 percent, albeit with the same debt-creating policies whose long-run sustainability is doubtful. And it seems to have

decided that it does not want a serious devaluation at this stage, which has calmed the unease about China's policies that was part of the uncertainty in the first quarter of this year. The dollar has weakened. All those things are helpful for our growth, but the uncertainties of potential Brexit remain.

So, what's next? Well, what's next is we wait until tomorrow to decide on the policy recommendations that follow from the present conjuncture. [Laughter]

CHAIR YELLEN. Thank you. President Rosengren.

MR. ROSENGREN. Thank you, Madam Chair. It was a puzzling dichotomy between the spending and employment data in the first quarter. The spending data were a disappointment. The Tealbook expects the first-quarter real GDP growth rate to be only ½ percent, which is slow even with diminished assumptions about potential real GDP growth. However, like the Tealbook, I am expecting the first quarter to be a lull rather than a trend, and one major reason is the continued strength evident in the labor market. We all know the aggregate employment numbers have continued to expand rapidly. Less-formal information reinforces those numbers. When talking to officials at colleges around New England, they are reporting robust results for their seniors about to graduate and an increase in recruiting activities on college campuses. However, it is not just those with high educational attainment that are enjoying the results of the tighter labor market. The strong growth in the participation rate since September highlights that as the labor market has tightened, more people are moving from out of the labor force to being employed. This also includes sectors of the labor market in which unemployment is elevated, such as minorities and those who have limited educational attainment.

I'm fairly confident that spending will rebound. Certainly, an important reason for the first-quarter weakness was low consumption growth. Like the Tealbook, I expect consumption to rebound in the remainder of the year due to favorable trends in the stock market, housing prices, and income. I also expect the recent weakness in business investment to abate. Those factors alone could push spending growth above potential. As it is unlikely that firms would continue to hire if they were expecting sales to weaken, I am placing more weight on the positive labor market data than on the first-quarter GDP lull. Nor am I particularly worried that with proper monetary policy the labor market will get too tight. My forecast calls for some further tightening of the labor market. There are certainly advantages to allowing the labor market to tighten somewhat further. Probing how low the natural rate of unemployment is currently will likely encourage more people to reenter the labor force, benefiting themselves and the overall economy.

In terms of prices, I am now a bit more confident that we're moving toward our 2 percent inflation target. At the time of our December FOMC meeting, core PCE inflation had not yet shown a clear positive trend and had been fluctuating somewhat below 1½ percent over much of the year. However, with core PCE inflation currently at 1.7 percent, there is more evidence of a positive trend. This casual observation is confirmed by work by my staff that has used a monthly error correction model that includes the gap between core CPI and core PCE inflation, along with lagged changes in inflation rates, the unemployment gap, and the relative prices of oil and non-oil imports. Using this model to conduct a dynamic simulation of the likely path of core PCE, they concluded that we are quite likely to see more progress in core PCE approaching our target. Private-sector forecasters seem to be drawing a similar conclusion. The Survey of Professional Forecasters, which provides forecasters' probabilities of different core PCE inflation outcomes,

is similarly showing forecasters placing modestly more weight on the FOMC moving closer to its target over the next two years.

I would also note that the concerns about significant downside risk, as reflected in the financial market turbulence over the first several months of this year, have subsided. Stock prices are higher. Stock volatility is down. Many interest rate spreads have narrowed, and many global financial markets have improved. This is consistent not only with my baseline forecast but also with surveys that assess tail risk. Neither the primary dealers nor participants in the Survey of Professional Forecasters see a particularly elevated risk of much higher unemployment rates in the next year and a half.

I must admit that with modal private-sector forecasts expecting economic growth above its potential rate and, consequently, further tightening of labor markets, as well as surveys not indicating a particularly elevated tail risk, I find the pricing in the federal funds futures somewhat puzzling. A divergence between our own views of the likely path of interest rates as reported in the March SEP and the market's pricing of very few federal funds increases over the next two years or more raises the risk of a taper tantrum reaction when we do raise rates. I will discuss how we should react to this risk in the policy discussion tomorrow. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Brainard.

MS. BRAINARD. Thank you, Madam Chair. Since we last met, the most notable improvement has been a significant easing in global financial conditions, which reflects in no small part a change in expectations surrounding the path of U.S. monetary policy. In addition, the labor market has remained strong, while the data on inflation and aggregate spending have disappointed.

Job growth, at 215,000 last month, remains strong, and the participation rate rose again. Since September of last year, while the unemployment rate has remained essentially flat, participation has increased 0.6 percentage point. This is very welcome, and it suggests that participation may be more responsive to improvement in labor market conditions than seemed to be the case for much of the recovery. If it continues, the prospects for growth in potential output would be somewhat more optimistic. Most of the increase in participation since September has been among prime-age individuals whose declining participation over the earlier part of the recovery had been puzzling. While recent increases have raised the prime-age employment-to-population ratio 1¾ percentage points above its trough in mid-2011, the prime-age EPOP ratio still remains 1½ percentage points below the average level before the crisis. This suggests some slack remains, which is reinforced by the relatively elevated share of employees working part time who want full-time work and the still-subdued pace of wage growth. As Bill Wascher pointed out earlier, the labor force participation rate for adult African Americans is about 3 percentage points below its pre-crisis level, similar to the gap for whites, and the gap is a little over 2 percentage points for Hispanics. While the overall unemployment rate is down near pre-crisis levels for whites and Hispanics, unemployment among African Americans remains above its pre-crisis level. Moreover, while the participation rate of African Americans is roughly equal to that of whites, their unemployment rate is twice as high, suggesting scope for further gains.

On inflation, the most recent data, the February PCE and the March CPI reports, suggest that progress toward our inflation target is likely to remain quite gradual. It now appears likely that the stronger readings at the start of the year reflected, in part, the residual seasonality, which has tended to produce higher PCE inflation readings in the beginning of the year and lower readings toward the end. Although the fall in the dollar since the beginning of the year should

help boost inflation this year, it may not persist. Indeed, the dollar has moved a bit higher in recent days, and in view of the global outlook, the risk of a higher dollar appears somewhat greater than the reverse. The subdued price pressures evident in the March CPI look likely to continue. If so, the 12-month change in core PCE prices should move down from the 1.7 percent readings reached in January and February to about 1.5 percent this quarter.

I remain concerned by the risk that continued low inflation will put downward pressure on inflation expectations. Market-based measures of five-year inflation compensation five years ahead have edged up since March, but they remain extremely low. Household survey-based measures of inflation expectations also remain low, as we saw in the preliminary April Michigan survey, which showed the median 10-year inflation expectation moving back down to 2.5 percent, significantly below the longer-run average.

The spending data in hand for the first quarter of this year are also disappointing. This first-quarter weakness, as others have noted, appears similar to a pattern we've seen in the preceding two years. However, it is worth noting that the apparent weakness in first-quarter GDP and PCE growth this year comes on the heels of relatively weak fourth-quarter GDP and PCE growth, which is in contrast to 2014 and 2015, when the preceding fourth quarters had seen more robust growth. Nonetheless, the downbeat data on economic activity contrast with the continued steady improvement in the labor market, which provides reasons to hope that the first-quarter spending data are once again understating the underlying pace of activity. The current data suggest consumption growth of a little less than 2 percent last quarter, but the fundamentals, including continued solid job and real income growth, buoyant sentiment, and rising wealth, all point to faster growth.

In contrast, the weakness in business investment, lower corporate profits, and still-elevated bond spreads may presage some slowing in labor demand. Orders and shipments of capital equipment have been trending lower for several months, and investment in intangible capital also seems to have softened, with investment in this category edging down over the second half of last year. When combined with continued sharp declines in energy-related structures, these data suggest a significant decline in business fixed investment last quarter.

Although weakness in the energy sector is in part responsible for these developments, a persistently gloomy foreign outlook is likely also weighing on firms' expansion plans. Even factoring in recent welcome improvements in Canada, recent data on the overall foreign outlook continue to suggest weak demand and downside risks. In Japan, even before the Kumamoto earthquake, activity had stagnated. The outcome of recent wage negotiations was quite disappointing, and despite extraordinarily accommodative monetary policy, it has been very difficult to raise inflation expectations, and inflation remains distant from the target. In Europe, economic activity continued its gradual recovery in the first quarter, but inflation and market-based measures of inflation compensation remain very low. With monetary policy extremely accommodative and no help from fiscal policy, progress on inflation remains vulnerable to shocks. Most immediately, of course, on June 23 voters in the United Kingdom will decide whether to remain in the European Union. A "no" vote could be highly disruptive.

Nonetheless, following February's very volatile market conditions, we've seen a substantial easing of financial conditions, which appears to coincide with a shift in expectations about the monetary policy path in the United States and of the dollar. Equity prices have rebounded. Oil and other commodity prices have stabilized or increased, and corporate bond

spreads have come down, although they remain elevated. Emerging markets have benefited as financing conditions have eased.

These developments have coincided with a stabilization of the Chinese RMB against the dollar even as the dollar has declined. The combination of dollar easing and additional capital controls led to a stabilization of China's foreign exchange reserves in March, along with a notable reduction in concerns about a sharp devaluation. Although Chinese GDP increased at an annual rate of only 5.4 percent in the first quarter, the most recent monthly data on industrial production and credit growth signal a step-up in GDP growth this quarter. But as was stated earlier, boosting near-term GDP growth through credit-fueled infrastructure investment does little to solve China's excess capacity or elevated corporate debt problems. Thus, while the threats to near-term economic growth have likely diminished, with overall debt-to-GDP on the order of 240 percent and credit growth reaching 15 percent this year, the risks to medium-term growth remain and may even be increasing.

More broadly, while conditions have eased, global financial markets remain fragile. Developments in the first three months of the year serve to highlight the significant feedback loop that connects U.S. policy expectations and exchange rate movements to China's currency management and economic growth challenges, which is then amplified through emerging market prospects and commodity market developments. Despite recent steps, China still lacks a predictable, transparent framework for monetary policy and exchange rate management. Thus, unexpected moves in the RMB or declines in foreign exchange reserves still have the potential to spark further bouts of financial turbulence that could reverberate more broadly.

On net, the balance of risks to the outlook appear to have improved somewhat since March. The general improvement in financial conditions due at least in part to expectations of a

more gradual path of policy firming in the United States has strengthened the medium-term outlook in the United States and helped boost commodity prices, diminishing worries about global disinflation, helping to ease the transitions faced by emerging market economies. But while the easing in financial conditions has improved the balance of risk in the near term, the current global environment contains deeply embedded risks. These, together with persistent sub-2 percent inflation readings, the evidence that inflation expectations are low, and the asymmetry of policy, continue to skew the risks to inflation to the downside. For these reasons, I would not want to rush to judgment about the outcome of our policy deliberations in June but rather continue to monitor the evolution of the data closely in the weeks ahead. Thank you, Madam Chair.

CHAIR YELLEN. Thank you very much. President Bullard.

MR. BULLARD. Thank you, Madam Chair. My remarks on the economy today will focus on two features of the current constellation of data that give me pause about the Committee's normalization strategy. The first one is slower real output growth than I expected, and the second one is low market-based inflation expectations.

The core prediction from standard models that inform the discussion on this Committee is that promises to keep the policy rate at very low levels would induce a boom in consumption and a rise in inflation expectations. In my judgment, these effects have not materialized in any quantitatively meaningful sense. This has left us with low nominal interest rates, which may not be pulling consumption forward and may not be putting upward pressure on inflation. I think this is putting our normalization strategy at risk. We are now 16 months past the end of quantitative easing in the United States. We have raised the policy rate just once, markets place low probability on a move by this Committee in June, and we have no immediate plans to reduce

the size of the Federal Reserve balance sheet. This seems like a normalization process that is grinding to a halt. In my view, this may be appropriate. But it should be described somewhat differently if this is, indeed, what is happening. I'll have some suggestions for this in a moment, and I will also discuss this in the policy go-round tomorrow.

Let me turn to low inflation expectations. Current market-based inflation compensation has recovered partially from the levels earlier this year, but not all the way to the levels at the time of liftoff last December. The 10-year TIPS breakeven rate, for instance, traded last Friday at around 1.65 percent. This number is too low on its face, but, in addition, it is CPI based. If we subtract 30 basis points to get to a rough calculation for PCE inflation expectations, we arrive at just 1.35 percent. One could arguably subtract risk and liquidity premiums from there to arrive at an even lower number. This is a 10-year expectation that should not be meaningfully different from 2 percent. I take this seriously as signaling a possible erosion of FOMC credibility with respect to our inflation target. I think it is very difficult to interpret the TIPS numbers favorably at this juncture.

Let me now turn to slow output growth. The annualized growth rates of real GDP have been 2015:Q3, 2.0; 2015:Q4, 1.4; 2016:Q1, according to the Tealbook, 0.4; 2016:Q2, according to the Tealbook, 2.2. So as Governor Brainard stressed, it's not really just the first quarter—all of the surrounding quarters are pretty low. The average of these four numbers is 1.5 percent. That's below my estimate of longer-term trend growth for the U.S. economy. Many of the policy projections I have made over the past two years envisioned a 3 percent growth rate during this same four-quarter period. So these numbers are quite disappointing. I think it's hard to reconcile plans to normalize rates in an environment of below-trend real GDP growth.

I recognize that labor markets have been strong and are likely to remain so. I continue to agree with the Tealbook that the unemployment rate is likely to fall into the mid-4 percent range over the forecast horizon. However, I expected stronger output growth at some point, which would have been more reflective of recent labor market outcomes. In addition, I see effects on inflation through a labor market channel as likely to be subdued. Eighth District contacts seem to concur that very slow growth is the order of the day. They tend to expect a subdued pace of expansion during 2016, tight labor markets notwithstanding.

What is the core problem? It is slow growth in productivity. I appreciated the staff's discussion of an alternative view, that productivity acceleration would be more gradual, on pages 22 and 23 of Tealbook A. I especially noted figure 1, which shows how prognostications of productivity increases have continually disappointed over the past six years. On this topic, I agree with comments by Presidents Lacker and Williams and Governor Fischer. In light of that evidence from figure 1 in Tealbook A in the alternative productivity projection, I think that the baseline should no longer be for an acceleration of productivity growth. Instead, we should accept that we are likely in a low-productivity growth regime that probably began in 2005 and that has probably worsened in the past five or six years, and we should make the baseline projection on the idea that we are unlikely to leave the low-productivity growth regime any time soon. Accelerating productivity growth would then become an alternative to the benchmark and not the benchmark itself.

It may be that our normalization strategy is incompatible with the slow-growth environment in which we find ourselves and in which the Committee often sees important downside risks. As many of you know, I have become more concerned about our normalization messaging in this environment. Our messaging is through the dot plot, which suggests imminent

increases in rates. In essence, we are always warning about rate increases. I want to suggest an alternative messaging that I think will leave us in a position to accomplish the same goals but will put us more in sync with financial markets.

The elements of this approach are as follows. But first a preamble is to recognize that we're now off the lower bound; therefore, rates in principle could go in either direction. So then number one would be the Committee would emphasize that, in view of everything that we know today, we think that the policy rate is at the correct level. This is the way we would have approached monetary policy in the '90s and 2000s. Number two, the Committee would emphasize that, in light of everything we know, risks are balanced at this juncture. That would signal to markets that rates could go up or down depending on how the data come in. The reason we're at the rate we are at today is because we think that's the right rate in light of all the things that we know about the economy. I think the balance of risks in the past, as President Lacker has emphasized, has been a subtle signal about which way you think rates are going. If we cite downside risks in an environment in which the dot plot says we're going up, that's a conflict and a confusing thing to markets in light of how this Committee has behaved in the past. So what we should do is say we like where the rate is today in light of everything we know. Given everything we know, we say the risks are balanced, which means we could go in either direction depending on how the data evolve. Number three, we should also stress appropriately that if inflation develops, we will raise rates commensurately in that case. And, number four, we are not giving any forward guidance on rates. We're at the correct level today, and future adjustments up or down will depend on macroeconomic events.

Thank you, Madam Chair. I will discuss this approach further in the policy round tomorrow.

CHAIR YELLEN. Thank you. Governor Powell.

MR. POWELL. Thank you, Madam Chair. Incoming data since the previous meeting provide mixed signals on the strength of the economy. As has frequently occurred over the past several years, labor market data suggest greater strength than do spending data. Fortunately, labor data have tended to give a more accurate picture of the underlying strength of the economy. Moreover, with ongoing job gains of 200,000 per month, income gains should be strong enough to maintain solid growth in consumption, and business investment should rebound to help meet rising demand. Thus, I have some confidence that spending indicators will strengthen in coming months.

That said, recent spending data are indeed weak. The Board's staff now estimates that real GDP increased at just a ½ percent rate in the first quarter after growing at only a 1.4 percent rate in Q4. Taken at face value, this could cause concern about prospects for economic growth, particularly because much of the weakness is in consumption and investment, the two main engines for growth. However, some of the low reading for Q1 may reflect residual seasonality. Indeed, analysts at the Board think residual seasonality may account for ½ percentage point of the slowdown. Other analysts estimate that it could be 1½ percent, which would put GDP growth in the range of 1 to 2 percent, a bit less worrisome.

Looking through these volatile and uncertain quarterly estimates as well as seasonality, the four-quarter change in real GDP shows GDP growth running at about 2 percent through Q1, and my reading of the fundamentals suggests that 2 percent is a pretty good estimate of the momentum of the economy and as good a guess as any for the future pace of GDP growth. The key factors driving demand over the past year remain in place: the high level of household wealth and solid job gains propelling consumption, and low long-term interest rates and

relatively easy access to credit supporting business investment. In addition, the recent drop in the dollar should reverse some of the drag due to past appreciation, and the stabilization of financial markets and the news from overseas suggest that the downside risks arising from these sources are still receding from their elevated February levels.

In contrast to the spending data, the labor market continues to show solid improvement, with businesses relentlessly adding 200,000 jobs per month. These increases and the optimism displayed in business surveys support the notion that firms not in manufacturing still judge that demand is rising at a moderate pace. Normally, job increases of this magnitude would be accompanied by a noticeable drop in the unemployment rate, but labor force participation has rebounded sharply over the past six months—another healthy development—and, consequently, the unemployment rate has flattened out.

Although some of that recent bounce in participation may turn out to be statistical, I hope and expect that some important part of it is the result of a tightening in the labor market as individuals recognize that jobs are now easier to get and thus enter or return to the labor force. This rise in participation is a welcome event, as it increases the productive capacity of the economy, suggests that the maximum level of employment may be higher than we thought, and, most importantly, improves the lives of many families.

However, as many have noted, productivity growth remains terrible, and these job gains have not been accompanied by the expected increase in output. This has been a persistent feature of the expansion in the United States and globally, as noted in the Tealbook box that's been referenced here today. I agree with the sentiments offered in the box, and I'm hard-pressed to see why we should expect productivity to rebound sharply in 2016. In fact, I found the two alternative simulations showing a slower return of productivity to the trend to be closer to my

thinking—one simply a supply-side shock and the other adding in continued strong payroll growth. The stronger economic growth is really the continuation of more of the same. It's 2 percent economic growth, and it's 200,000 jobs a month. And it's a slower return in productivity that gets you to a 3.9 percent unemployment rate at the end of 2018. In fact, my baseline would be located somewhere between the two, probably closer to the "Weaker Labor Productivity, Stronger Labor Market" scenario.

Accordingly, I continue to expect 2 percent GDP growth will be accompanied by ½ percent increase in productivity this year and 200,000 jobs per month. If participation remains at 63 percent, that would imply a three-tenths decline in the unemployment rate by the end of the year or a steeper decline if the participation rate begins to fall again. This ongoing tightening in resource utilization should put some additional upward pressure on wages and prices, and I remain confident that inflation will rise, particularly as the effects of declines in oil and import prices fade over time. With core inflation now running at 1½ percent, the underlying core inflation rate that looks through effects of the temporary swings in the dollar and energy prices is actually much closer to 2 percent. With the dollar and oil prices apparently having stabilized, the fading of their influence should move core and total inflation up to 2 percent over the medium term.

Now, the Tealbook says that we are at full employment, but I'm not at all certain that there aren't remaining elements of slack, and it gets harder to argue that with participation having increased. In any case, I'm open to the idea that there may be remaining margins of slack. Inflation is below target and real long-term interest rates are low, and this combination indicates either that there is remaining slack or that the economy is still experiencing significant headwinds and requires accommodative policy.

While I expect these headwinds to diminish over the next couple of years, I doubt that they will fully dissipate during this cycle, which would mean that the federal funds rate and longer-term rates will still be relatively low over the medium term. The Committee's rate forecasts, including my own, have consistently erred to the upside to an extent that is not fully explained by unexpected economic weakness, and my view is that rates will need to remain lower for longer than the Tealbook forecast in order to achieve the baseline. One reason for this view is that investors have had a heightened focus on the differences between U.S. monetary policy and that of foreign central banks.

The Tealbook rate forecast would deliver a very large surprise to markets, and yet the dollar would appreciate only gradually. As the Board's staff pointed out in a useful presentation on Monday and as Steve emphasized in his presentation, there's a real risk that the dollar would appreciate much more than the forecast. The baseline forecast is based on longer-term relationships between interest rate surprises and the dollar. The dollar has been many times more responsive since mid-2014, when the dollar began its appreciation, and that's also true for the almost 3 percent decline since the March meeting, which is far larger than the adjustment in interest rates would have been implied using historical relationships.

I would add that when these relationships seem to change, the staff is always in the position of having to decide whether to go with the old relationships or take new data onboard, and it's the same question with productivity. I am not sure it really matters as long as the risk of being wrong is exposed, as has clearly been done in both of those cases. So on this question, the reaction has been appropriate, and the risk that's been identified is another reason to proceed cautiously with rate increases. More on that tomorrow. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Kaplan.

MR. KAPLAN. Thank you, Madam Chair. I'll start with energy. The production freeze negotiation among OPEC members in Doha ended with no agreement. We'd expected that these negotiations would not have any supply–demand effect primarily because Iran has consistently said that it is intent on increasing its production to pre-sanction levels. Although there was much made of these Doha discussions, most of our contacts in the industry had expected nothing to come out of these meetings, and the meetings lived up to expectations. Therefore, the breakup of these talks really did not materially affect our outlook for the energy sector, and we think that's one reason why you didn't really see much of a price effect.

Our latest estimate is that global energy supply today still exceeds demand by more than 1 million barrels. We believe that supply and demand will reach rough balance by the first quarter of 2017, and we think it is this expectation that is the fundamental force driving the firming of prices. This forecast assumes that global demand will grow by 1.2 million barrels a day in 2016. It also assumes that there will be a substantial decline in non-OPEC production, primarily in the United States in the second half of this year, as the effects of cuts made over the past two years finally lead to production declines as wells run down and are not replaced by new wells. We believe excess inventory in the OECD countries now stands at 440 million barrels, which is a record. We also assume in this forecast that, although there have been supply outages in Nigeria, Iraq, Libya, and, most recently, Kuwait, all of those outages either have been resolved or will be resolved and production will be restored.

More important, looking ahead and on the basis of discussions we have had with our contacts as well as a new energy survey that we've just started and that will be published in June—this will be a quarterly energy survey with more than 165 participants—it is our judgment that the breakeven price for most shale projects in the United States ranges between $35 and $50

a barrel, depending on the field. So, for example, at $40 to $45 oil, in our judgment it is simply not economic to invest in new wells in much of the Eagle Ford or the Permian Basin, which are the two biggest fields in this country. This tells us that in the $40s, very few new wells will be drilled in shale, and very few jobs will come back to the oil industry. In the range of $50 to $60, however, some rigs will begin to be added, you'll see supply begin to increase, and jobs will start to come back. In addition, we've learned that one of the big effects of the declines over the past two years has been that a substantial number of the long-lead-time conventional projects have been scrapped. The very big cuts in cap-ex have come from those very long-lived projects that take as long as 7 to 10 years to complete and have decline curves exceeding well over 20 years. These projects fundamentally increase global oil supply. Shale projects, on the other hand, can be developed very quickly and are relatively bite-size in terms of cost, but they have decline curves of only 2 to 3 years. Those are useful in providing incremental supply.

When you combine all of these facts—and recognizing that OPEC is currently operating at a historically high level of capacity utilization—it is our view that as global demand continues to grow over the next few years, we could likely find ourselves in a global undersupply situation within three to four years and vulnerable to a price shock on the upside. I know that'll be a big change in perspective, but we think that is more likely than not as we work through increasing shale supply and don't have these long-lived projects to call on. But maybe that's wishful thinking for people in the industry and it's going to take a few years.

In terms of the 11th District, we now expect job growth in Texas to range between ½ and 1 percent in 2016, down from 3.7 percent growth in 2014. The change reflects job losses in Houston while jobs continue to increase in Dallas, San Antonio, and Austin. The service sector in Texas continues to grow, while the manufacturing sector continues to be weak, although our

recent survey indicated that it is showing some signs of stabilizing. Texas continues to benefit from migration of people and firms to the state, and this helps further drive the diversification of the Texas economy. Energy is now only 2 percent of employment and 9 percent of GDP in the state of Texas, versus 14 percent of GDP in 2014.

One last comment on the 11th District: It is clear to us that job growth in Texas as well as in our District generally has benefited from the increasing number of trade and production partnerships with Mexico. Texas imports from Mexico, for example, have 40 percent U.S. manufacturing content on average. These partnerships, in our judgment, have helped to keep jobs in North America as well as to stimulate spending in the United States by Mexican shoppers who regularly come across the border to buy goods and services. It is an element, we believe, in allowing U.S. companies to avoid relocation of even more manufacturing jobs to Asia. And we will continue to watch this dynamic closely because it's been a key strength, in our view, for Texas as well as to the United States, and is probably—perhaps an understatement here—misunderstood.

In terms of the U.S. economy, our economists expect the U.S. consumer to remain strong in 2016, and, as a result, we expect GDP growth to rebound in coming quarters. Like others around the table, we are forecasting GDP growth of about 2 percent in 2016. We believe there is some—but increasingly limited—remaining slack in the U.S. labor market, and we expect the headline unemployment rate to continue to decline below 5 percent this year.

Regarding inflation, through last month, the Dallas trimmed mean has now been running between 1.8 and 1.9 percent, although there is some seasonality in this measure, and we would expect it to back off to some degree. Nonetheless, that gives us some increased confidence that headline inflation will gradually rise to 2 percent over the medium term. When you take all of

those facts together, they cause me to be increasingly constructive about the June meeting, a subject we'll pick up tomorrow.

One caution, which surprised me a little bit in getting prepared for this meeting, came out of our round of 25 or 30 calls. In previous calls, our corporate contacts described business as stronger than they do now. This time around, most of them now describe their business in the United States as flat to down. The contact group includes a number in the services sector, and the responses were really across industries. Several mentioned the "CNN effect:" They believe that the consumer should be getting stronger, but households are hesitating to spend because of political uncertainty as well as potentially because of some psychological holdover from the financial turmoil during the first two months of the year. In the meantime, these companies are focused more on cost-cutting, see relatively little wage pressure except in skilled trades and IT, and are holding off on major capital spending and other new projects. Time will tell whether this sluggishness is temporary. Thank you, Madam Chair.

MR. HARKER. Madam Chair.

CHAIR YELLEN. Yes.

MR. HARKER. Just a quick question. What do your economists think will be the effect, if any, of the Saudi sale of Aramco?

MR. KAPLAN. We don't think that alone is going to have a significant effect. The thing we are watching more closely—although we don't believe it's going to happen— is whether Saudi Arabia and Russia are, as they have hinted, actually going to increase supply. The privatization is part of an overall strategy for the Saudis to diversify away from oil. It is one of many steps they're going to take to try to redirect resources to other parts of their economy and be less dependent on oil. So the sale is a natural evolution of that.

CHAIR YELLEN. Thank you. President Evans.

MR. EVANS. Thank you, Madam Chair. The reports on economic activity from my business contacts were a bit more upbeat than in March. Notably, no one expressed much concern that the first-quarter weakness in GDP would prove to be more than a transitory soft patch. In my District, there continues to be a large contrast between conditions in industrial versus consumer-facing businesses. Those producing industrial capital goods who have heavy international trade exposure are seeing weak demand. Those facing the U.S. consumer are more positive.

Some of the weakness in cap-ex is easy to explain by the strong dollar and low energy prices. Other anecdotal reports are more challenging to square. A couple of my directors and other contacts say that even with low interest rates and plenty of cash on hand, firms are choosing not to invest, and we heard that just a minute ago. These firms clearly say that they are right-sized for the current level of demand, their outlook for continued slow growth, and the potential downside risks. So it seems there's another factor beyond the dollar and low commodity prices weighing on capital spending—namely, business caution. Firms' baseline sales expectations are modest, and they're very attentive to what could go wrong.

With regard to the economic picture, the first quarter obviously was quite weak. My staff's outlook is that economic growth will recover to average around 2½ percent over the rest of the year. I can't say that forecast is wrong. I am not optimistic myself. But if residual seasonality remains anywhere, it would seem to be in our collective early-year optimism, which is then followed by downward revisions to the outlook in the middle of the year. I guess that's seasonality too, isn't it? And I could see the same happening with this forecast, as realistically the risks are probably to the downside.

With regard to inflation, the incoming data were consistent with our forecast of core PCE at 1.6 percent for the year, although we continue to see some downside risk associated with a potential decline in inflation expectations. In any event, our Federal Reserve Bank of Chicago forecasts of economic growth and inflation are very similar to the Tealbook's. However, we do have a somewhat different view of labor market slack. We think the labor force participation rate is still somewhat below trend, and this translates into a little more overall slack in labor markets than in the Tealbook.

An important factor supporting our forecast is the continuation of the improvement in credit conditions that started in mid-February. This improvement was a major theme among our financial market contacts this round. Our contact who tracks small business lending reported a pickup in demand for credit in February after markedly negative reports in three of the previous five months. Consistent with our real-side anecdotes, small business lending is strongest among consumer-facing firms and firms providing nontradable goods and services. Our contacts at Ford noted that they received a lot of interest from banks in the renewal of their credit line syndicate, and that the spreads on their commercial paper and other debt were the narrowest in about a year. Finally, in line with Simon's report from the dealer survey, a number of financial contacts said that FOMC communication about risk management was a critical factor supporting the recent improvement in financial conditions. In their opinion, the Fed's willingness to lean against adverse tail risk has been an important stabilizing force.

To sum up, on balance, the domestic fundamentals continue to be good. My baseline scenario has economic growth recovering from its first-quarter soft patch and the recent improvements of inflation being maintained. But downside risks remain, and our risk-

management approach to guard against those risks continues to be a salient feature of appropriate policy. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Lockhart.

MR. LOCKHART. Thank you, Madam Chair. In preparing for the policy decision at this meeting, I spent a lot of time considering the divergence between the data on economic growth in the first quarter and my forecast. The latest update of our GDP nowtracking estimate puts first-quarter growth at 0.4 percent, the same as the current Tealbook estimate. Our first-quarter nowcast began to deteriorate in mid-March with the arrival of February data on retail sales, durable goods, personal consumption, and international trade. We will know on Thursday how accurate the estimate of 0.4 percent turns out to be. But there is broad consensus among available tracking estimates that first-quarter GDP growth is likely to come in below 1.0 percent.

A slow first quarter was not my expectation at the time of the previous SEP submission. I had marked in a first quarter that was close to my assumed run rate for the economy, between 2 and 2½ percent. The facts in hand regarding spending growth present the problem of whether to take the first-quarter data weakness as signaling a deceleration or to look through the apparent weakness and treat it as anomalous in some respects. So this could be a *déjà vu* moment all over again. In recent years, first-quarter real-time readings of the economy have tended to be deceptively soft.

Now, I am not picking up softness in reports from my District contacts. Recent soundings present a more upbeat picture than the data on spending. Sentiment among our directors and contacts remains positive and showed some improvement since the previous cycle leading up to the March meeting. Consumer spending activity overall was characterized as stable and is not decelerating. Business investment activity seems to be steadily growing at a

moderate pace, and we sensed no cautionary signals in the mix of investment. A reasonable amount of business fixed investment is being depicted as growth oriented. Real estate activity across the Sixth District remains solid. Commercial real estate fundamentals remain within a range that sounds no alarms. Residential starts and sales activity continue to increase at a slow but steady pace in most parts of the District.

One of the more interesting and generally upbeat contact interviews was with the CEO of one of the nation's largest credit reporting firms. Its credit dashboard through February had household debt rising 3.2 percent year over year, so the positive household credit trends evident in the flow of funds accounts last year are apparently continuing. Auto credit led the advance, but bankcard extensions were also strong. And the growth in first-quarter mortgages has been solid. Delinquencies and write-offs are holding at modest levels. So this contact characterized the mix, growth, and performance of household credit as healthy and supportive of a good pace of spending.

We did pick up some cautionary vibes from auto industry contacts, particularly our director who is CEO of the country's largest car retailer. His industry-wide perspective depicted the recent softening in auto sales as likely materially worse but for incentives that are nearing 10 percent of the sales price. Inventories remain elevated, and our contact expects production schedule cuts soon to restore balance. Sales numbers have been juiced by expanding fleet sales, and there has been a surge in leasing at discounted valuations. The implication is that auto asset value contraction may ripple through the national fleet in future years, affecting trade-in values and new auto pricing. Overall, we came away from conversations with our auto contacts concluding that the auto spending tailwind will likely be a headwind over the near to medium horizon.

That said, the pockets of softness we detected in our conversations with District contacts do not appear to suggest a broad-based deceleration. At the moment, there seems to be a disconnect between anecdote and data. Something of a disconnect is also evident, of course, comparing employment data with weaker signals on GDP growth. Reports of our contacts on the employment situation were in line with the official data prints. Stories about difficult-to-fill jobs persist in categories like IT, construction, trucking, health care, and other technical jobs. Layoffs continued in recent weeks in the oil and gas and gas-dependent industries. These reports overall were consistent with earlier cycles. We did hear more reports than previously that we interpret as indications of labor market tightening. For example, we heard that part-time workers are being converted to full-time employment, and that concerns about retaining talent are causing some companies to develop catch-up plans. We heard the expression "war for talent" for the first time in a long time in more than one interview.

The strong market performance, the fundamentals that should support stronger consumer spending, our contacts' general optimism, and some firming of the inflation trend have persuaded me to leave my outlook essentially unchanged from our previous meeting. However, the prospects for a weak first-quarter GDP print driven by both weak consumer and business investment spending and the general ambiguity of the current circumstances give me pause. For that reason, as I'll explain in the policy round, I'm looking past this meeting regarding the rate move. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Harker.

MR. HARKER. Thank you, Madam Chair. Economic activity in the Third District continues to improve, and our manufacturers may be over the worst of the recent downturn in that sector. Despite some backtracking in our Business Outlook Survey, there has been a

significant increase in optimism among our manufacturing contacts. Employment growth is strong, consumer spending is growing moderately, and commercial construction continues to grow at a slow but steady pace. There is some evidence of increasing overall price pressures in the region. But with regard to real estate, and with the exception of the Philadelphia metro area, house price appreciation still appears to be restrained.

Our Manufacturing Business Outlook Survey edged back into negative territory with the April general activity index reported at minus 1.6. Shipments significantly weakened, as did the employment subindex. However, unlike previous reports, respondents are seeing price pressures developing for both prices paid and prices received. In direct contrast to readings on current activity, manufacturers in the region have grown increasingly optimistic. The diffusion index for future general activity has jumped 13.4 points to 42.2. All the future subindexes reflect a rebound in optimism as well. In contrast, a diversified manufacturing contact in the region indicated that 10 of his 12 business lines will report negative profits this quarter. January was an exceptionally weak month, and although succeeding months are showing some improvement, that improvement has not been substantial. For the year as a whole, most business lines are forecasting profitability, but his outlook is not overly optimistic. So it is with a bit of cautious optimism that, all told, my take is that the area manufacturers have seen the worst of the slowdown.

In a set of special questions directed at expenditures for both data and network security, physical security, and expenditures incurred for meeting regulatory burdens, we found that a significant majority of firms were increasing outlays on data and network protection as well as regulatory compliance, but that most were not facing increasing costs of providing for physical

safety at the workplace. One fairly frank respondent indicated that his firm didn't mind the increased regulatory burden, as it acted as a barrier to entry and thwarted competition.

Nonmanufacturing activity in the District continues to grow modestly as reflected in our Nonmanufacturing Business Outlook Survey. The headline activity index of 17.8 in March, while expansionary, is below its nonrecessionary average. Like our manufacturers, area service providers remained relatively optimistic, with expectations of future activity fairly optimistic. Some 68.5 percent of respondents reported increased expenditures on data and network security, 50 percent showed increases to enhanced physical security, and slightly more than half have increased spending in order to satisfy regulatory compliance. In light of the responses in these categories, a reasonable conjecture might be that some of the productivity slowdown may be due to expenditures that, one could argue, produce little in the way of productive output. They simply just protect what you have as opposed to growing output.

Our Beige Book contacts reported a slight to modest improvement in economic conditions. Homebuilders have reported an improvement in traffic, and a large builder reported an appreciable increase in backlogs. Overall, construction activity continues at a slow but steady pace. With the exception of the Philadelphia metro area, house prices, as I said, have not risen appreciably.

Now, for the nation as a whole, economic activity appears to have softened significantly, although I agree with President Williams's analysis of Q1 GDP. We may be looking at two consecutive quarters of economic growth averaging in the neighborhood of 1 percent, but time will tell. Labor markets, however, remain robust, but consumption appears to be more restrained. And although I believe manufacturing is bottoming out, I do not anticipate a significant bounceback.

My overall view and forecast of real economic activity are fairly consistent with that presented by the staff in the Tealbook. However, my view on inflation is that we will see a path that returns to target somewhat faster than the glacial pace presented in the Tealbook, perhaps by the end of next year. With unemployment falling below its natural rate and the significant price pressures resulting from various forms of legislation, I don't believe price increases will be delayed for much longer. Recent data on inflation as portrayed by core measures and various trimmed means reported by my colleagues, as well as the behavior of the dollar and oil prices, make me more assured that inflation will return to target. And I see little evidence that inflation expectations have become unanchored. That viewpoint drives me to favor statement language that would in no way preclude June from being a live meeting, but more on this tomorrow.

CHAIR YELLEN. Thank you. President Mester.

MS. MESTER. Thank you, Madam Chair. Overall economic activity and sentiment in the Fourth District remain consistent with continued moderate economic growth. The Bank's diffusion index for business contacts reporting better versus worse conditions moved up to plus 16 from the plus 14 I reported at our previous meeting, which had been the highest reading in more than six months.

Manufacturing and the energy sector continue to be challenged, but one of our directors reports that we may be seeing some bottoming out in the energy and primary metal sectors. Reports from auto and related manufacturing industries indicate that activity levels remain stable. In contrast to President Lockhart's contact, auto contacts in the Fourth District remain quite upbeat despite the decline in vehicle sales in March and a two-week shutdown of the GM auto plant in Lordstown, Ohio, due to supply disruptions caused by the recent earthquake in Japan. A director from one auto producer noted that his company is expecting motor vehicle

production to remain stable at high levels, with sales for the year matching last year's pace of nearly 17½ million. The strength in autos led to more positive reports from freight transportation contacts who saw the volume of shipments increase.

District labor markets continue to show solid progress. The Federal Reserve Bank of Cleveland staff estimates that District employment grew 1½ percent over the year ending in March; the District's unemployment rate has remained low and stable, estimated to be 5.1 percent in March. A variety of business contacts continue to report tighter conditions in labor markets, including rising wage pressures for unskilled occupations in the retail sector and difficulty in finding skilled workers in construction, high-quality manufacturing, and quantitative occupations.

The regional director of a significant national federation of labor unions who sits on our Cincinnati branch board indicated that, to alleviate some of the mismatch between jobs and skills, they have established an apprenticeship program in industrial trades similar to the one they have for the construction trades. After a successful pilot in Wisconsin, they have secured funding to expand the program into six other states. Those types of programs hold the promise of partially alleviating some of the country's longer-run workforce development issues, which remain significant but are not solved by monetary policy.

Overall, my view of the national economy has changed little from our previous meeting, although we didn't get the pickup in first-quarter growth I was hoping for. Instead, growth remained sluggish. I am feeling a sense of *déjà vu* that I hope will continue, because in 2014 and 2015, weak first quarters were followed by strong second-quarter rebounds. Anecdotal evidence suggests that activity may have picked up toward the end of the first quarter, which is consistent with the sharp rebound in financial conditions since our previous meeting.

The disparity between modest and moderate output growth and the solid performance of the labor market continues. Payroll growth has averaged nearly 250,000 jobs per month over the past six months. The labor force participation rate and the employment-to-population ratio each have risen 60 basis points since last fall. Both are above their trend estimates. In my view, the economy is at maximum employment from the perspective of what monetary policy can do. I note that the Tealbook now assesses there is essentially no slack left in the labor market.

The strength in the job market and, with it, the rise in personal income, is an important fundamental that will support consumer spending. I found the Tealbook's analysis of the effect of energy prices on consumer spending quite useful. First, it validates that consumers have been spending at least part of the gain from lower oil prices, although less than the FRB/US model predicted. It appears that many have been saving at least some portion of the gain. The marginal propensity to consume the windfall will vary by income level, and that may be reflected in the stronger spending effect that's picked up in studies that utilize microspending data. The Board staff suggests that most of the spending gained from falling energy prices may have already been realized. But an alternative view is that consumers have just shifted the spending to a later time when they might have more confidence in the health of the economy. In any case, the increased savings will help support future consumption. We will need to watch for signs of whether some fundamental shift in consumer spending is occurring, but so far nothing points to a sustained pullback in the consumer sector.

Business investment remained weak in the first quarter. I have some concerns about the implications of this for capital deepening and, therefore, for longer-run structural productivity growth. But in the short run, some of the forward-looking indicators from the national ISM and

some of the regional manufacturing surveys suggest a future pickup in new orders may be coming. Housing continues to grow at a moderate pace.

Inflation is rising gradually. You can see this across a broad array of measures. Inflation is behaving like the Committee expected: As oil prices and the dollar have shown some stability, the economy has continued to expand, and inflation expectations have remained reasonably well anchored. Rates of both core and headline inflation have increased over the past year and over the past six months. The Federal Reserve Bank of Cleveland staff nowcast for April put PCE inflation at 1 percent and core PCE inflation at 1½ percent. The PCE measure is up 80 basis points and the core PCE measure is up 20 basis points, compared with a year ago and compared with six months ago. Core CPI inflation, which helps to predict headline, has been running above 2 percent this year. The Cleveland Federal Reserve's median CPI measure has also been rising gradually over the past year and now stands at 2.4 percent.

At this point, I continue to forecast economic growth slightly above trend for the year as a whole, some further improvement in labor markets, and inflation continuing to move up gradually to our 2 percent goal. The economy will be supported by monetary policy that will remain very accommodative, even as we bring rates up gradually, which I view as appropriate conditional on the outlook. I note that my outlook takes into account the expected divergent paths of monetary policy here and abroad.

Of course, risks remain to the outlook. The risks are centered on global economic developments, including the possibility of sustained financial market disruptions caused by the United Kingdom's upcoming decision of whether to stay in the EU. At this point, I assess the possibility of a sustained disruption as remote, and, in my view, global risks have decreased since earlier in the year. This is reflected in the easing in financial conditions and a return to

more normal volatility compared with earlier in the year. On the basis of the solid performance of the labor market, there are some upside risks to the forecast as well. Overall, I see the risks to the outlook as being roughly balanced.

I am increasingly hearing from contacts in my District that our policy communications are somewhat muddled. This concerns me. It's an indication we have not clearly articulated our policy rationale. I see this as a potential risk to our ability to implement effective policy, a risk that we shouldn't ignore. The Committee has continued to indicate that we view a gradual upward path of rates as appropriate and consistent with our outlook. With our employment goal now largely met, with inflation gradually moving up to our target as anticipated, and with downside risks subsiding somewhat, the question should no longer be, "Is it appropriate to take the next step on the normalization path?" But, rather, the question should be, "Is it really appropriate not to take the next step?" Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President George.

MS. GEORGE. Thank you, Madam Chair. District economic growth continues to lag the nation as low agricultural and energy prices persist and financing conditions continue to tighten. In the ag sector, not much has changed since our previous meeting, and agricultural sector bankers are buckling in for a bumpy year of unprofitable farm operations while they extend more credit secured by land.

In energy, the rig count is at its lowest level since at least 1949, and oil inventories are at their highest level since 1930. Stockpiles are expected to begin easing in 2016 as oil production declines intensify, which may provide a modest boost to prices. But according to various Federal Reserve energy surveys, the average price needed for firms to remain profitable is $53 per barrel, down from $59 last fall, as firms focus on the best plays. Still, firms, on average, do

not expect this price to be reached until 2017. Even when prices do rise, our contacts note they will not be able to ramp up activity in any meaningful way for several years because of the huge loss of skilled workers, depreciation of equipment, and tighter financing.

In addition, natural gas prices remain unprofitable, and, thus, bankruptcies are rising for oil and gas companies in the region. Some are relatively smooth Chapter 11s, but others, mostly small companies, are taking the Chapter 7 route. As I watch the energy sector in my region, I think of a line of Hemingway in which one character says, “How did you go bankrupt?” The other says, “Two ways. Gradually, then suddenly.” Coal producers have been particularly hard hit. Three of the four large coal companies that operate in Wyoming, where 44 percent of U.S. coal is produced, have filed for bankruptcy. Drastically reduced coal production is also negatively affecting the region’s rail industry. However, beyond these commodity-based businesses, our business contacts remain relatively upbeat.

For the national economy, my outlook is little changed despite a weaker-than-expected first quarter in which consumers held back and investment cuts intensified. In terms of the consumer, the slowdown looks to be limited to goods purchases, which I view as somewhat reassuring because a more broad-based slowing, including services, might have pointed to more fundamental weakness. Despite the decelerating spending growth, the pace of job gains has remained robust, still averaging more than 200,000 per month this year. Financial conditions have also eased since March. And, provided job growth and financial conditions remain stable, I expect consumer spending growth will come back. One of our contacts in the apparel industry noted that, although profits were up and sales declined in the first quarter, she projected positive sales growth for the rest of the year. That’s reassuring, as clothing and footwear was one of the weak categories of real PCE in February.

Regarding housing, the moderate recovery appears to remain on track, though low inventories and rising prices suggest that construction of single-family homes has been a bit slow to respond to rising demand. Looking ahead, I expect residential investment will continue to contribute to economic growth, though I see some risk to the outlook for multifamily construction. Our directors report jitters as a large number of units are coming online across the region. Longer term, the demographics remain favorable for multifamily construction, but right now we are seeing a rise in vacancies in some markets.

An important aspect of the outlook is how the economy will continue to manage through the pivot away from manufacturing and energy activity to services. One implication of this shift is for productivity growth. My staff estimates that the relative decline in manufacturing and energy, which are significantly more productive than services industries, has cut overall productivity growth by about ¾ percentage point over the past year. Although this offers an explanation for soft productivity growth the past few years, it doesn't explain the longer downward trend in productivity growth. Indeed, some portion of the recent weakness in productivity seems structural, and I don't believe monetary policy can do much to change that. This raises concerns similar to those highlighted in the Tealbook box offering an alternative view on the outlook for productivity.

Finally, my outlook for inflation is little changed and has inflation near mandate-consistent levels throughout the forecast horizon. The effects of the past dollar appreciation and oil price declines should diminish, particularly with the recent reversals in the dollar and oil prices. The realized gains in inflation increase my confidence that, with continued improvement in economic activity, inflation will continue moving toward 2 percent over the forecast horizon. Thank you.

CHAIR YELLEN. Thank you. Governor Tarullo.

MR. TARULLO. Thank you, Madam Chair. I was tempted to ask the question of what it means to say that there's no slack in the labor market or that we're at maximum or full employment in the absence of significant nominal wage growth, but, as I spoke a good bit already today and this situation may be mooted somewhat over the course of time, I guess I won't address it. But if it's still relevant in June, it may be something that would be worth many of us talking about.

I'm going to confine myself to a few comments on risks. At the March meeting, my baseline outlook was for economic growth of roughly 2 percent, or maybe a little bit more, this year, and I thought risks were weighted to the downside almost exclusively because of global risks. Today I think my baseline outlook is for economic growth just a tad lower than that because of the first quarter. I still find the risks weighted to the downside, but the reason for that has changed somewhat. I formerly thought that domestically, the risks were just about balanced, and that globally, they were pretty significantly to the downside. I think, for reasons that many of you have said, the global risks are somewhat mitigated compared with March, but I now find a little bit more risk in the domestic outlook.

The reasons for that are essentially what the staff and a number of you have already commented on. But I took some signal from the weak first quarter, and the reason I do take some signal from that and the reason why I'm a little bit confused by the invocation of residual seasonality as an explanation for why signals shouldn't be taken from that is the following: I would have thought that most of us, and particularly those of us inclined to see residual seasonality as relatively more important, would have by now adjusted our Q1 assumptions based on the apparent presence of that factor in four out of the past five years. That is, you've already

seen residual seasonality, and you now say, "Okay, that exists. And so, therefore, as I do my Q1 or H1 assumptions, I'm going to take that into account." Assuming that's the case, then the numbers in Q1, judging by the March SEP, were still a downside surprise that needs to be explained. And I looked, actually, at some of the public analysis by one of our Reserve Banks that I think is at the high end of assessments of residual seasonality, and I saw that their description of the outlook in December was for a rebound in Q1 growth with strong consumption performance. Then the same Reserve Bank toward the end of March said, "Well, we're expecting flat growth, but that's because of residual seasonality." I'm having trouble putting those two things together, because why wouldn't the residual seasonality have been apparent from the outset?

What are the explanations, then, for low Q1 economic growth? One is that the slowdown reflected an increased gap between actual and potential output. A second is that it's just weird and anomalous, and it'll disappear. Another, however, which is suggested by the continued robust growth in employment over that period, is that potential growth needs, once again, to be marked down. Now, this third explanation, when added to the previous markdowns in potential, has, I think, quite complicated implications for monetary policy because it simultaneously suggests, on the one hand, that input markets—including labor—may tighten sooner, but, on the other, it suggests that r^* may be lower than even our revised estimates.

I'm not sure what the implications for monetary policy decisions are, but if there is something to the first quarter other than residual seasonality—which I think there almost has to be—I think we are all forced to offer another explanation and almost to allocate how, among those three or others, would you weight the actual occurrence in the first quarter? I think our staff roughly split the difference between my first and third, some of which is a markdown in

what they expect for economic growth this year because of some continued underperformance, but some was a markdown in potential. That's probably as good a resolution as any, but I think it does matter. I would also note, I did go back and look at the Tealbooks for the past three Aprils when the first quarter has disappointed and then we sort of try to figure out, okay, what happens next, and it's great. One time we underestimated what the effect on the rest-of-the-year economic growth would be. A second time we overestimated what it would be, and the third time we got it just about right. I guess my conclusion from that is, it's a little hard to tell right now, and I hope that by June some of this will begin to be clarified.

Globally, I agree with those of you who say that risks do seem to have, in general, with a big Brexit exception, diminished somewhat. I think Governor Brainard, or someone else down at this end of the table, put it quite well already, so I won't repeat all of that—on China, the euro zone, and a little bit of stabilization while Japan continues to struggle. Near term, I think risks are lower elsewhere. I'd have to say I was struck during the Bank–Fund meetings by the admirable straightforwardness in people from the euro zone saying, "You guys are going to raise rates, right? Because we need that downward pressure on the euro in order to increase our performance over time." Again, I admire their forthrightness, but it did give one a little bit of pause.

Brexit—I really don't know how to assess Brexit, to tell you the truth. This feels to me more like Knightian uncertainty than just risk assessment, because we don't really have precedents for this sort of thing. And so, I suppose, if the markets are right and if the polls are right and the United Kingdom votes to remain, we won't have to worry about any of this. But if there is a surprise or a shift, I genuinely don't know how to make an ex ante assessment. One thing I will say—following up on something Vice Chairman Dudley said, which I thought was

important—is if there is a "yes" vote, then there will be some increasing uncertainty because of the prospect that other members might think about exiting.

I believe that that would be the case, and I believe that in response, influential people in the euro zone are going to make it very hard for the United Kingdom to renegotiate, and that those renegotiations will be quite unpleasant. And there may even be a little bit of self-damage by the euro zone, just because they are afraid that if the U.K. exit makes it look like this is something that you can manage okay, and you can get a free trade agreement right afterward, then they really do risk the dissolution of the EU. If the United Kingdom votes to leave, although it's a little hard for me to see it as a big financial stability event in the short term, I have to say I'm leaning toward thinking the macroeconomic effects of this might be pretty substantial over the course of the next year or so.

And when you add to that the fact that, as a couple of people have noted, China is kind of in a "let's keep everything together now" mode by continuing to amass debt, and the euro zone is counting on us to increase rates so that the euro goes down, I'm not sure that—and this, I thought, was Steve's point—in the medium term, the underlying forces that are creating risk have actually dissipated that much, even though in the short term they have.

Putting all of this together, these changes strike me as about a wash in the overall balance of risks, which I still see as moderately to significantly to the downside, albeit somewhat differently composed than six weeks ago. Thank you, Madam Chair.

CHAIR YELLEN. A two-hander. President Williams.

MR. WILLIAMS. You talked about our analysis.

MR. TARULLO. Yes, I'm talking about you all.

MR. WILLIAMS. Yes, let's be transparent. [Laughter] But can I respond?

MR. TARULLO. But I wasn't going to talk about the 49ers and their prospects this year.

MR. WILLIAMS. Oh, why did you even do that?

MR. TARULLO. Well, who started it?

MR. WILLIAMS. Throw me off my game. Okay. I have an answer to the question.

MR. TARULLO. Okay.

MR. WILLIAMS. The question is a good one. The question was how our own thinking evolved. First of all, in 2015 the BEA actually did a pretty thorough analysis of this residual seasonality and wrote a white paper on it. The BEA claimed that it had attacked most of the aspects of this, including PCE and QSS and other things. And so we took on board that we were probably going to be rid of most of the residual seasonality in GDP. But then Glenn Rudebusch and his colleagues redid the analysis and found, much to their surprise, that most of it was still there, at least in GDP. That's where we came up with the numbers I mentioned today. So that was a bit of a surprise to us after the BEA had done this Manhattan Project, if you will, on this.

My other comment is, I tend to focus on four-quarter changes in GDP, just like I do on PCE prices and other things, because I know there's noise in the data. In our view, GDP growth on a four-quarter basis hasn't moved around very much. It's 2 to 2¼ percent, and as I said, I'm at 2 percent now. I think it's probably the easier way to avoid some of these issues on a four-quarter basis. But the answer to your question is how our thinking evolved on that. We actually thought that was probably going to go away, or at least mostly go away, and were somewhat surprised that it hasn't.

CHAIR YELLEN. Thank you. President Kashkari.

MR. KASHKARI. Thank you, Madam Chair. The Ninth District economy suffered a major shock last week with the death of Prince. The good news is that this was not a

destabilizing shock, but it really unified people across the District and the Bank celebrating his life and his music.

In other economic news, the Ninth District continues to perform relatively well. However, the global weakness in commodity prices is having a notable effect on oil, as we have heard, as well as on mining and agriculture. Oil production in North Dakota is now down about 10 percent below its peak in December 2014, and a large bank in our District has increased its expected losses on oil business lending. Other industries in the District are generally faring much better, and there are some emerging signs of labor tightening. For example, a national retailer with a large local presence has just raised its minimum wage to $10 an hour, and anecdotal evidence suggests that other retailers are following suit.

At the national level, the risk of recession seems to have declined somewhat since earlier in the year. Although first-quarter economic growth has been very weak, as we have just discussed, a variety of leading indicators suggest a rebound ahead. In particular, the stock market has risen, the VIX is low, and consumer confidence remains high.

In the labor market, the rapid pace of hiring has continued, as we have discussed at length. I personally think the continued rise in labor force participation is very welcome news and is very important, and I don’t have confidence that there is no more slack in the labor market. I think that, if anything, we’ve learned that there is a lot that we don’t understand about what’s happening in the labor market. And if we can continue to bring people into the labor market while the headline unemployment rate remains fixed, I personally think that we should allow that to continue. And, on the other hand, weak productivity growth is troubling for all of us.

Inflation and the inflation outlook also remain weak. Oil and commodity prices are still low; the dollar remains strong. Although some large employers are raising pay, this has yet to show up in aggregate wage measures, and measures of inflation expectations remain at extremely low levels.

Looking overseas, the IMF has again downgraded its forecast for global economic growth in 2016. In addition, global inflation remains very low, and, as a result, there is very little prospect of imminent monetary policy tightening in any developed economies.

In summary, I am cautiously optimistic that moderate growth will continue in the U.S. economy. I hope that continued improvement in the labor market will eventually bring inflation and inflation expectations back up to 2 percent. But I have to admit that, as yet, I don't see any concrete evidence that this is occurring. I continue to agree with the Tealbook that risks to the outlook appear to be tilted to the downside. Thank you.

CHAIR YELLEN. Thank you. Vice Chairman.

VICE CHAIRMAN DUDLEY. Thank you, Madam Chair. My views don't differ materially from what I've heard around the table. The economy appears to have slowed rather sharply in Q1, but most of the fundamentals remain supportive of economic growth. In particular, job gains remain sturdy, household real incomes have been rising at a decent clip, fiscal policy is stimulative, and financial conditions are now much easier compared with just a few months ago. So my baseline view is pretty much the same as everybody else, that growth will pick up in coming quarters and that real GDP will rise at about a 2 percent pace this year.

All that said, however, I am still somewhat concerned about the outlook. I don't fully understand the forces behind the first-quarter real GDP slowdown. And I very much have the same view as Governor Tarullo that we already knew that there was this residual seasonality

issue in our forecast, and so most of us have been surprised by the first-quarter slowdown. I don't want to put it all on the residual seasonality.

I think there is some risk that rather than GDP speeding up to meet payroll growth, we could see payroll growth slow down a little bit so that it rises at a pace more consistent with the modest growth rate in the economic activity. I also am somewhat concerned about the weakness in consumer spending growth. In some ways, I feel like that's the bigger issue because the fundamental supports for consumption in Q1 were really very positive in terms of employment growth, declining gasoline prices, and a saving rate that looked rather elevated relative to disposable income. Yet we see this real weakness in consumption that I think is very hard to explain.

One potential explanation is that we're just too optimistic about where we think the saving rate is supposed to go. I can think of a number of reasons why the saving rate might be higher than what we think it should be. When we look at the bivariate/univariate comparisons of net worth to income and where the saving rate is, we are leaving out all sorts of other variables. Some of the things that might point to a higher desired household saving rate would be, one, scarring from the financial crisis: People are saving more for precautionary reasons, or lenders are more unwilling to lend. Remember, this is a net savings rate, and so the lending side also weighs on that. The increasing skew in terms of income distribution would also point to a higher saving rate. The aging of the population would tend to point to a higher saving rate. The decline in real interest rates and how that affects expectations about future rates of return, how much savings people need to have a comfortable retirement, would also all point in the same direction. I think there is this notion in our mind that Q2 is going to be the inverse of Q1. Spending is

going to rise faster than income, and the household saving rate is going to decline. I just think that is not necessarily obvious to me.

In terms of Governor Tarullo raising the issue of lower potential GDP growth, I think the implications for policy are frankly pretty straightforward. It seems to me that if you have lower potential growth, you're going to run out of capacity sooner; you're going to run out of slack in the economy sooner; and you're going to be less tolerant of a rise in nominal wage growth because the rate of nominal wage growth consistent with your 2 percent inflation objective is going to be somewhat lower. It seems to me it points to going a little bit sooner, but then it also implies a lower terminal federal funds rate because, presumably, r^* is lower. I guess I would say it's sooner, but a lower terminal rate. Maybe that's what the bond market is sensing, because 10-year Treasury bond yields seem pretty low.

On the inflation side, I continue to be of the very boring view that if we get the 2 percent real GDP growth, then we'll get a gradually tighter labor market. If we get a gradually tighter labor market, we'll see rising wages. And with that, we'll eventually see an upturn in core inflation. I continue to take quite a bit of positive signal from the fact that the core inflation rate has been pretty steady over the past year on a year-over-year basis despite the stronger dollar, weaker energy prices, and the decline in some measures of inflation expectations. That is actually a pretty good performance when you factor all of those things into the equation. If second-quarter economic growth does rebound and labor market momentum remains broadly intact, then I think that points to another increase in our federal funds rate target. But there is this small problem of the timing of the Brexit vote, and I want to talk a little bit about that.

I think the risk of a leave vote does raise the bar a little bit for June because we are not going to know the outcome of the Brexit vote, or the market response to the Brexit vote, at the

time of the June meeting. For me, it wouldn't be that comfortable to vote for a rate hike on June 15, have Britain vote to leave the EU on June 23, and have that trigger a big selloff of financial markets and a significant tightening of financial conditions soon thereafter. The obvious question that such a decision would raise would be: Well, if the FOMC knew that there was going to be this Brexit vote and they knew there were risks associated with this Brexit vote, why didn't they just wait a little bit longer? Another way to think about this is that waiting for more information does have option value, and that option value should be weighed against the cost of waiting. Now, obviously, if the prospects of a leave vote at the time of the June meeting are very low, then the option value of waiting is also very low. In my mind, it is going to really depend on where we are at the June meeting, what that probability of exit looks like at that time.

What I think is going to happen is, if there are no real new events in Europe, the probability of the leave vote is likely going to fade gradually. The reason why I think it's as high as 29 percent right now is there's a good deal of time during which bad things can happen in Europe that could push the probability of leaving upward. And if nothing bad happens in the interim, I think what will happen is that probability will erode. I hope that when we get to the meeting, the probability of a leave vote will be very low, and then we can just not worry about that in terms of thinking about the June timing. But I am not really sure how to think about this and how much it should weigh on the rate decision in June, and I am very curious and would be very interested, in sidebars or tomorrow when we talk about monetary policy, just to hear what people think about how they're factoring in Brexit in terms of how they think about the timing of June, one way or the other.

Finally, I have a couple of thoughts about why financial market conditions have improved. I think we need to think about that because it does have implications for monetary

policy. I see a number of factors as having been at play: recovering oil prices—I never knew that higher oil prices were good for financial conditions, but I guess it's true at some point; stronger Chinese economic data; a weaker dollar, which has eased the pressure on the RMB and made Chinese currency policy a less pressing issue; and the shallower expected path of tightening with respect to U.S. monetary policy. If you think that expectations about U.S. monetary policy are an important factor behind the recovery in financial markets, and you view the improvement in financial market conditions as mostly desirable, then I think that does have implications for U.S. monetary policy.

I am still in the "two more rate hikes this year" camp. If we did this, it probably would result in somewhat tighter financial market conditions, as this would be somewhat more than what's expected by market participants. But I currently expect that some tightening in financial conditions will be appropriate at some stage this year, in view of the tightening labor market and the likelihood that inflation will be somewhat higher over the medium term. But at the end of the day, how much we will need to do in the end will not just depend on how the forecast evolves, but also on how much our actions affect financial conditions, and I just don't think we have a very good feel for that at this stage. Thank you, Madam Chair.

CHAIR YELLEN. Thank you, and thanks to everyone for a very interesting round of comments on the economic outlook and the risks. What I'd like to do is wrap up with a couple of observations of my own. Before I get started, though, let me say that our photographer is going to come in now and take a couple of pictures. And before he does that, let me ask you, if you have any confidential material sitting in front of you, to cover it up.

[Short break]

CHAIR YELLEN. Okay, let me start off. As many of you have noted, the news from the labor market continues to be good. Monthly payroll gains averaged almost 210,000 over the past three months, just a little slower than the robust pace last year. And labor force participation was up again in March, continuing the recent trend that's allowed the unemployment rate to remain roughly flat since October even as the employment-to-population ratio has risen markedly. The pool of potential workers—the unemployed plus those who would like a job but are not actively looking for work—has continued to shrink. These developments show that labor utilization is continuing to rise.

That said, I still see some room for further improvement. Involuntary part-time employment has moved sideways since the fall and remains elevated relative to its pre-crisis level. Wage growth continues to be sluggish. The unemployment rate is still ¼ percentage point above my estimate of its longer-run level. And some undershooting would be highly desirable in order to return inflation to 2 percent more quickly. This is a point illustrated by the alternative optimal policy simulations reported in the Tealbook. These alternative simulations, unlike the usual ones, more sensibly assume that welfare losses occur only when the unemployment rate rises above the natural rate, not when it falls below. As a result, it becomes optimal to push the unemployment rate to a very low level for a time, and this result holds even if the Phillips curve is much steeper than the staff estimates.

Unfortunately, in contrast to the labor market data, spending and production indicators have been surprisingly weak. The downward revisions in the staff's real GDP forecast for Q1 are concentrated in private domestic final purchases, which are generally viewed as a more reliable indicator of underlying economic growth than GDP itself. Consumer spending, in particular, has slowed markedly from the robust pace seen last year despite solid income gains, a

relatively high level of household wealth, and healthy readings on consumer sentiment. In addition, drilling activity is still contracting, other types of business investment remain soft, and net exports continue to be a substantial drag on the overall economy.

Taken together, these developments suggest that a persistent slowdown in aggregate spending may be under way, which could hinder further improvement in labor market conditions. This recent spate of weak spending and production data represents a new source of downside risk to the forecast. But like many of you, I have not significantly altered my baseline outlook. I agree with the Tealbook's assessment that the weakness we have seen in aggregate spending is likely to prove transitory. That strikes me as pretty consistent with what I heard around the table. A few of you did mention rather downbeat anecdotes from your contacts, but, by and large, outside the sectors that are most strongly affected by declining commodity prices, weak global economic growth, and the strong dollar, I did not hear many reports from your business contacts suggesting any obvious pronounced downturn in economic activity or any significant negative reassessment of future sales prospects.

As several of you noted, the Q1 slowdown may partly reflect measurement problems and other transitory factors, such as the financial market swoon in the first quarter that is now entirely reversed. Moreover, as the year progresses, both the contraction in drilling and the drag due to past dollar appreciation should fade. Although downside risks relating to domestic spending may have increased somewhat, I see the risks relating to global economic and financial conditions as having diminished.

One factor contributing to this improvement has been the downward shift in market expectations concerning the likely pace of our own policy tightening. Partly in response, financial conditions have significantly improved with the dollar down about 2½ percent, longer-

term Treasury yields and mortgage rates down roughly 20 basis points, risk spreads on corporate bonds narrower, and equity prices up almost 5 percent. Overall, therefore, neither my baseline economic outlook nor my assessment of the balance of risks has changed appreciably, on net, since the previous meeting.

With regard to inflation, the data we have received since the March meeting suggest that the March Tealbook was correct in viewing the unexpectedly high readings on inflation in January as likely to be largely transitory. The current Tealbook forecast that core PCE inflation will come in at about 1½ percent on a four-quarter basis this year, with headline inflation running closer to 1 percent, strikes me as entirely reasonable. Absent further shocks to oil prices and the dollar, I continue to expect that inflation will move up to 2 percent by late 2018 with some further improvement in labor market conditions. I also continue to view the risk to this outlook as tilted slightly to the downside in light of the low readings on inflation compensation and the slippage over the past couple of years in some survey measures of expected longer-run inflation.

Anticipating tomorrow's discussion, let me say that in my view, incoming data create sufficient concern about the outlook that it makes sense to leave the federal funds rate unchanged at this meeting. But we definitely need to keep our options open for June, and I would see a strong case for raising the target range for the federal funds rate another 25 basis points at our next meeting if incoming data confirm that GDP growth is picking up about as expected, if the recent pace of improvement in the labor market continues, and barring other developments that we judge to appreciably alter the balance of risks. And, of course, in that regard, I am concerned about the potential for significant financial market turbulence in the run-up to the Brexit vote. It's something we will have to watch very carefully and consider, as the odds evolve and we watch financial market reactions, what our appropriate response should be.

Looking forward, if employment continues growing at anything close to its recent pace, our policy deliberations will need to grapple with the issue of how long that can continue without the economy overheating. Payroll gains surely need to moderate substantially at some point to avoid too large an undershoot of unemployment below its longer-run sustainable rate. But it's entirely possible that labor force participation may continue to surprise to the upside for a while longer. Estimates of the level of the trend participation rate are unavoidably imprecise. And even though the staff has revised up its estimate of the trend in response to the recent surprises, a tighter labor market could potentially draw yet more people back into the labor force on a sustained basis. Such a development would be of great benefit to the nation, and we need to be wary of inadvertently blocking it by tightening monetary policy too quickly or too much.

Further increases in labor demand may also be partially satisfied by reductions in involuntary part-time employment, which is still 1 percentage point above its pre-crisis level. I recognize that this persistence may reflect structural changes that have permanently increased the demand for part-time workers, but employment practices also depend on the ease and cost of finding workers who are willing to work less than full time, something that may become increasingly hard to do as the economy nears full employment. And in this regard, I think it's noteworthy that a number of major retailers—including J. Crew, the Gap, Abercrombie & Fitch, and Pier 1 Imports—are now phasing out their use of on-call scheduling, which is a practice that is extremely convenient for managers but one that's highly unpopular with workers.

We will also have to wrestle with the implications of low productivity growth should it continue. Our longer-run SEP numbers for real GDP growth suggest that many of us, like the staff, have been assuming that trend labor productivity will accelerate appreciably over time to a pace more in line with its historical average. But as the Tealbook warns, and as many of you

emphasized in your comments today, productivity growth may remain low for the rest of the year and beyond. If such an expectation is already incorporated into household and business decisions, as assumed in one of the Tealbook simulations, then continued low productivity growth could cause the unemployment rate to fall appreciably over the next few quarters despite relatively slow real GDP growth. In this event, we may need to tighten policy more quickly than we currently anticipate. But as another Tealbook simulation shows, if households and firms are also surprised, then slower productivity growth over the next several years might have only limited implications for the paths of both employment and monetary policy. In this case, the level of aggregate demand would shift down roughly one for one with surprising weak productivity. Another possibility not simulated in the Tealbook is that productivity growth might surprise everyone by being permanently lower, and that's something that would likely result in a much slower than anticipated pace of tightening because it would reduce the long-run equilibrium funds rate. In light of these and other ambiguities, we will have little choice but to monitor developments carefully and avoid being overly confident in any projection.

So with those remarks, let me stop there. We have a lot of time tomorrow for the policy round, so I suggest letting Thomas begin with his policy remarks first thing tomorrow morning. We have dinner and a reception across the street.

[Meeting recessed]

April 27 Session

CHAIR YELLEN. Good morning, everybody. My gavel has been restored. [Laughter] To start off this morning, I want to turn to Steve Kamin to talk about this morning's trade report.

MR. KAMIN. Thank you, Madam Chair. Today we received the advance report on U.S. trade. Just to be clear: The full report on March U.S. trade, including exports and imports of both goods and services, is going to come out next week. But today's release is the preview, based just on nominal merchandise exports and merchandise imports. And these data are going to be used in the advance GDP release that will come out tomorrow.

We were expecting that the trade balance for March would be a $47 billion deficit, which would have been the same as in February. In the event, merchandise exports, which we expected would stay more or less the same, fell $2 billion, but merchandise imports fell about $8 billion, compared with a small rise that we were anticipating. As a result, our estimate for the trade balance in March has fallen from $47 billion to $41 billion. Assuming we don't get any surprises either in trade prices, which we have not yet received, or in trade in services, which we have also not yet received, we would lower our estimate for the net export drag on U.S. GDP growth in Q1 from our current estimate of 0.7 percent to only 0.1 percent.

CHAIR YELLEN. Wow.

MR. KAMIN. So, in principle, if that full change in our net export estimate was passed through to U.S. GDP growth, it would actually raise our Q1 estimate of real GDP growth by 0.6 percentage point. That's what we know on the trade side, but Bill will expand on that a bit.

MR. WASCHER. In terms of the components, what detail there is in the trade report suggested that there was a big drop in capital goods imports, which may mean that we would offset a little bit of the smaller drag arising from net exports by weakening our investment

forecast a bit. So I guess at this point, I'd say our Q1 estimate for GDP growth is going to be somewhere between ¾ percent and 1 percent, still up noticeably from the 0.4 percent that we had in the Tealbook.

CHAIR YELLEN. Are there any questions for Steve?

MR. FISCHER. Doesn't a decline in imports say something more than about capital goods? It's also about other demand, isn't it?

CHAIR YELLEN. Consumer spending?

MR. WASCHER. It could be. Again, we have a lot of information on consumer spending, so we don't take a lot of signal, on the basis of the trade data, for our consumer spending estimates for Q1 at this point.

MR. KAMIN. Of course, when the BEA writes in its guesses for services for March, we don't expect any big changes, but it's possible that they would surprise us, and the net export drag that would be in tomorrow's GDP data might be a little different than we expect. But right now, we think there's clearly been a shortfall in our estimate, and that should show up.

CHAIR YELLEN. Okay. Well, let's begin our policy round. I'd like to call on Thomas to start us off.

MR. LAUBACH.[6] Thank you, Madam Chair. I will be referring to the handout labeled "Material for the Briefing on Monetary Policy Alternatives."

As Simon noted yesterday, your communications following the March FOMC meeting, accompanied by some good news on foreign economic activity, appear to have contributed importantly to calming global financial markets over the intermeeting period. As illustrated in the top-left panel of the exhibit, sovereign yields here and in other advanced economies declined across the curve. While such widespread declines often have been associated with investors seeking to reduce their exposure to risky assets, in this instance it seems to have reflected investors' assessment that central banks would act to reduce downside risks to the global economy. Consistent with that perception, equity prices rose around the globe, and, as illustrated in the top-right panel, corporate bond spreads reversed their run-up of

[6] The materials used by Mr. Laubach are appended to this transcript (appendix 6).

earlier in the year. Steve noted in his briefing that the firming in oil prices and the depreciation of the dollar—developments that might be viewed as negatives for the global outlook—also appeared to support the improved tone in financial markets. The continuing rebound in oil and other commodity prices seemed to ease the pain for commodity producers and reduce tail risks for U.S. energy firms, while the softness of the dollar made a more disruptive RMB devaluation against the dollar less likely, at least for a time.

By contrast, as Bill Wascher discussed in his briefing, the incoming information on domestic economic activity, the labor market, and inflation has been challenging to interpret. The draft of alternative B you are considering today acknowledges the crosscurrents in the recent data but indicates that the Committee anticipates the economy will get back on a track of moderate expansion with further strengthening of the labor market and with inflation rising to 2 percent over the medium term. If the incoming information on the economy between now and the June meeting supports that outlook, alternative B is intended to leave the possibility of an increase in the federal funds rate in June firmly on the table without pre-committing to a particular decision.

A separate question is whether alternative B positions the Committee to respond appropriately to outcomes off its baseline trajectory. The draft alternative communicates that you are less concerned about risks associated with global economic and financial developments than in March, though still concerned. It does so by replacing the sentence in the March statement that indicated that global developments pose risks to the outlook with new language that says you will closely monitor global developments and inflation indicators.

The middle-left panel highlights three sources of uncertainty on which you may have some greater clarity by the time of your June meeting. For instance, the spending indicators might pick up, or they might remain weak and cast doubt on a continuation of labor market improvement, which in turn might leave the Committee less confident in its baseline view. Alternatively (or in addition), a renewed deterioration in financial conditions—possibly triggered by the looming Brexit referendum—might be seen as a factor that could cause the Committee to stay its hand in June. The wording in alternative B continues to recognize that developments abroad may significantly affect how the U.S. economy will evolve.

The middle-right panel highlights some of the fundamental medium-term uncertainties you are confronted with that the data you will receive during the intermeeting period will not materially reduce. As highlighted in the alternative view box presented in Tealbook A, the evolution of productivity during the current expansion raises the possibility of a more sobering longer-run growth outlook than we currently anticipate. By current estimates, labor productivity has risen between 2011 and 2015 by just under ½ percent per year, on average, the worst five-year performance in postwar U.S. history. Whether continued weak productivity growth would result in a commensurate slowdown in demand over the medium term or in a faster take-up of resource utilization and attendant inflation pressures is a key

question for the outlook beyond the near term. Another risk is that inflation might fail to rise as expected later this year. It may be that a combination of slow economic growth and a decline in inflation would pose the most difficult challenge in light of the limited space that remains for conventional monetary stimulus in the advanced economies.

In a new question in the Desk surveys of primary dealers and market participants, respondents were asked about their perceptions of your likely reaction if economic developments over the remainder of this year deviated significantly from the outlook summarized by the March SEP medians. The matrix in the lower-left panel shows the level of the federal funds rate that the median respondent would expect to see at the end of this year if core inflation and/or the unemployment rate deviated 50 basis points in either direction from the medians reported in the March SEP. This panel was lovingly referred to by some of my colleagues as the Mondrian box, and, in fact, I asked my RA to make a version of it that would remind you very much of that. [Laughter] But perhaps for the sake of legibility, I thought we should go with a more restrained version. The shaded box at the center shows that, if economic conditions at the end of the year match the March SEP medians of 1.6 percent for core PCE inflation and 4.7 percent for the unemployment rate, the median respondent to the Desk's surveys expects the federal funds rate to be 88 basis points. The other boxes tell us two things about dealers' and market participants' perceptions. First, they believe you would respond more strongly to deviations in inflation from your projection than to deviations in unemployment—that is, there are greater variations in the entries as you move up or down the table than when you move left or right. Second, they believe that you would respond more strongly to inflation outcomes that leave you even further below your 2 percent goal—moving from the middle row to the upper row—than to higher-than-expected inflation.

The draft of alternative B for this meeting would report in paragraph 2 that the Committee is continuing to "closely monitor inflation indicators and global economic and financial developments" and would retain in paragraph 4 the language that "the Committee will carefully monitor actual and expected progress toward its inflation goal." That is, the Committee would be stating that it will be alert to the types of scenarios that could result in a shortfall of core inflation from the Committee's baseline expectation—those that might fall in the upper row of the matrix. In such circumstances, respondents to the Desk's surveys expect that you would react relatively strongly, at least for any unemployment rate outcome within the range shown.

They also anticipate that you would raise the funds rate more steeply if, over the next several quarters, the economy was on a track to both higher inflation and a sharper-than-expected drop in the unemployment rate by year-end—the outcome in the bottom-left corner. But they seem to anticipate a more cautious reaction to higher inflation if the unemployment rate comes in as expected (the middle cell in the bottom row), and they project that you would increase rates even more gradually if the higher inflation occurred at a time when the unemployment rate was increasing (the bottom-right cell).

Why do respondents think that you will react more to lower-than-expected inflation than to inflation reaching 2 percent faster than anticipated? One possibility is that they believe policymakers are concerned about the potential for the economy to become mired in a low-growth, low-inflation state. Monetary policy would have limited scope to stimulate real activity in this situation, as these developments would reduce the equilibrium real interest rate further and so increase an already considerable risk of being persistently stuck at or near the effective lower bound. The red dots in the lower-right panel show that the median respondent to the Desk's surveys sees the neutral real federal funds rate at the end of this year as having drifted down significantly since last summer. The same is true for the median estimate of the longer-run real federal funds rate, the blue triangles, under the assumption of inflation attaining the 2 percent objective over time. With scope for providing monetary policy accommodation possibly further diminished, the cautious outlook for future rate increases described in paragraph 4 remains appropriate.

Thank you, Madam Chair. That concludes my prepared remarks. The March statement and the draft alternatives are shown on pages 2 to 9. I'll be happy to take the Committee's questions.

CHAIR YELLEN. Thank you. Are there any questions for Thomas? [No response] Okay. Seeing none, why don't we begin our go-round, and I'd like to start with President Rosengren.

MR. ROSENGREN. Thank you, Madam Chair. I support alternative B. It is appropriate to see whether the weakness in spending for the first quarter is reflecting more than a temporary pause in real GDP growth. My expectation is that the second quarter will be stronger. If the incoming data between now and the June meeting confirm that real GDP is growing at least as fast as potential GDP and labor markets are continuing to improve, then, in my view, it will be appropriate to raise the federal funds rate by 25 basis points.

On account of my expectation that we will not move at this meeting and my assessment that it will be appropriate to move at the next meeting, I do have communications concerns. My reading of alternative B is that it is unlikely to significantly increase market perceptions of the probability attached to a tightening in June. If that is correct, the market probably has too low a probability regarding both a tightening in June and our likely policy rate path over the forecast

horizon. The market's expectation that we may move only 75 basis points through 2018 reflects much more pessimism than I have about the economy and, in my view, risks a taper tantrum response as the market realizes that, while policy will be accommodative from our perspective, it will not be nearly as accommodative as financial markets currently expect. If the incoming data over the next two months are consistent with the Tealbook forecast—and recognizing that we will not have another SEP to signal policy intentions—we will need to communicate more clearly before the June meeting about the likely path of policy. Thank you, Madam Chair.

CHAIR YELLEN. Let me say that I do have a speech that I've scheduled for June 6, which is the very last day before the blackout period. I know that's pretty close to the meeting, but I did schedule it in order to be able to communicate reasonably clearly if it becomes utterly evident that there's a gap between market expectations and our likely behavior. And I know others also will be speaking.

MR. FISCHER. Do you know which ones?

CHAIR YELLEN. Lots of people, I suspect. [Laughter] Now, Governor Tarullo.

MR. TARULLO. Thank you, Madam Chair. I support alternative B. As Thomas indicated, the change in the language in paragraph 2 indicates a slight downgrading of concerns about the global economy. As I said yesterday, that's consistent with my own assessment of the risks that I think we can more or less get our arms around. As I also said yesterday, I don't quite see how to get our arms around the Brexit risk. It's closer to Knightian uncertainty than to some risk that we can do an assessment of. Having said that, I don't think it would be the wisest thing in the world to refer to that either directly or indirectly, so I'm okay with the language as it exists here. My own position with respect to June is not a tilt toward raising rates, although I'm open-

minded on the topic, and I think the virtue of this alternative as presented is that it maintains everyone's optionality. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Brainard.

MS. BRAINARD. Thank you, Madam Chair. As always, I found the comparisons in the Tealbook among the various policy rules very helpful. In particular, the optimal control rule that places greater weight on deviations of inflation from its target than on unemployment running below its assumed natural rate has some intuitive appeal, both because we have some uncertainty about what the natural rate is in the wake of the crisis and because it's hard to see the welfare costs associated with having unemployment run a bit low temporarily, as distinct, of course, from any possible implications that may have for inflation.

I took two lessons from this analysis. First, even with this policy rule that places greater weight on inflation, we have to work pretty hard to get inflation back up to its target, which it does not reach until 2018. In fact, interestingly, this is the only policy rule that gets inflation back to 2 percent by 2018. The slow rise in inflation is due in part to a very flat Phillips curve. But even assuming nominal wage growth is four times more responsive to the unemployment gap than it currently appears to be—a setting that might be associated with a nonlinearity in the Phillips curve near the natural rate of unemployment—inflation doesn't get back to 2 percent until 2018, with a policy rate path that is shallower than that in the March SEP.

Of course, achieving our target on inflation under these scenarios requires that unemployment will run below what we currently believe to be its natural rate, and that inflation will run about one- to two-tenths above 2 percent from 2019 to 2020. And, of course, the public would need to believe that the FOMC would tolerate such a modest overshoot due to the symmetry of our inflation target around 2 percent. I think that's an important thought exercise—

remembering that, in 70 out of the 74 months since the beginning of 2010, the 12-month change in core PCE inflation has been below 2 percent and that we are indeed comfortable with being symmetric around the 2 percent target.

Turning to today's context, I see the intermeeting period as mixed. On the one hand, financial market conditions have improved notably, but I believe this is in no small part a response to a perceived softening in the expected rate path in the United States and its spillback effects through pressures on China's currency peg and, through that, to broader emerging market risks. Oil appears to have reached an inflection point, and China's stimulus, while it raises some questions about long-term sustainability, appears to be supporting near-term economic growth.

Here at home, however, despite ongoing strength in the labor market, domestic spending indicators have disappointed for the second consecutive quarter, and there's some concern that U.S. consumption may be softening despite important supports coming from income, the behavior of gasoline prices, and sentiment. Importantly, the data suggest that the earlier improvement in core inflation may have been relatively short lived, and measures of inflation expectations and inflation compensation remain low.

Progress in the labor market has continued. Interestingly, the composition of that progress has changed with a shift toward the participation margin, suggesting a greater elasticity of labor supply than previously thought. Wages have been subdued, and, as in March, there still appears to be just a little more slack remaining.

The broad-based easing in financial markets has brightened the medium-term outlook a bit and made the balance of risks more favorable. But it's important to recognize how closely tied this improvement in financial conditions is to recent monetary policy communication, particularly including, I think, the downward shift in the policy rate path implied by the SEP,

which has suggested an awareness on the part of this Committee of the risks posed by the global environment and the need to shape policy in accordance with those risks.

With realized economic conditions relative to our goals, particularly inflation, little changed since March, and with the medium-term outlook also only modestly changed, especially after taking into account recent monetary policy communication, it seems appropriate to leave the federal funds rate at its current level. At our next meeting we'll have received two more labor market reports, two more PCE inflation reports, two estimates of first-quarter GDP growth, and some of the spending data relevant for assessing second-quarter GDP. These data will be important for me in helping to determine whether the weakness that we're seeing currently is likely to prove persistent as well as whether we're seeing any improvement in progress on inflation and on, importantly, inflation expectations.

This leaves me very comfortable with the wait-and-see approach that the Committee has adopted and that is captured in alternative B. My preference is to reserve judgment about possible actions in June and to let the data do the talking. Thank you.

CHAIR YELLEN. Thank you. President Lacker.

MR. LACKER. Thank you, Madam Chair. I believe this would have been a fine meeting to raise the target federal funds rate. Short-term real interest rates lie well below all of the benchmarks we use for evaluating where real rates ought to be—benchmarks derived from estimated policy rules that capture our successful past behavior and from estimates of the natural real rate, taking into account that real rates may have been trending downward. Even under plausible assessments of the secular decline in real rates, we are more than 1 percentage point below where we need to be.

One argument for keeping our policy rate low is that inflation is below our target. But in recent months, we've seen various measures of underlying inflation rise toward 2 percent, and, as I said yesterday, I believe a broad firming trend is now evident, notwithstanding the March CPI. The lag between policy actions and inflation responses leaves me expecting this trend to continue. Of course, many of our benchmarks take into account the difference between current inflation and our objective. Even with the remaining gap, they indicate that rates should be far higher.

When we lifted off in December, we expected to close the gap between the actual policy rate and the levels indicated by our benchmarks at a gradual but deliberate pace. Early in the first quarter, financial market developments at home and abroad raised prospects of downside risks to U.S. growth. Those risks seemed to have diminished substantially by the time of our March meeting, but, nonetheless, we left rates unchanged and pulled down our rate projections. Now that those risks have dissipated more conclusively and the U.S. economic outlook is in line with what we were projecting in December, we need to return policy toward the path we thought to be appropriate back then. At this meeting, therefore, it would be appropriate for us to resume gradually pushing rates toward a more normal level.

Yes, data dependence implies that when downside risks appear to rise, both the policy rate and the expected rate path should respond. And if those risks subside, the policy rate path should respond accordingly in the opposite direction. If not—if we delay raising rates in response to every episode of financial market heartburn but never correct course when the turmoil dies down—we will leave ourselves with a shortfall in rates that I fear we may not be able or willing to close fast enough when the time comes. It looks like we're at risk of doing just that in June if Brexit heartburn stays our hand. I hope we can all agree that if we delay because

of Brexit and then it turns out to be a manageable event, we don't necessarily have to wait until September to see if we want to move again.

If it is correct that monetary policy is too easy and has been for some time, then the stability of inflation expectations is a remarkable testament to our credibility. The longer we deviate from our policy rate benchmarks, however, the more we draw from the reservoir of that credibility. I cannot claim to know how or when we will reach its limits. Indeed, the evolution of expectations, as Governor Tarullo noted yesterday, is hard to predict. It is possible that even staying put through the end of the year would not test it, but I see it as a significant risk as long as we delay closing gaps to our benchmarks. Thank you, Madam Chair.

MR. TARULLO. Madam Chair.

CHAIR YELLEN. Two-hander—Governor Tarullo.

MR. TARULLO. President Lacker, because you did refer to me, can I ask, you're worried about expectations becoming unanchored, in view of where inflation is right now?

MR. LACKER. I'm not worried about them being unanchored tomorrow.

MR. TARULLO. But you're worried that the approach to 2 percent may unanchor inflation expectations, while you weren't worried that, for a number of years, the failure to reach 2 percent could have unanchored those expectations?

MR. LACKER. Inflation has gone from below 2 percent to well above 2 percent before. We had this experience in 2003 and 2004, when we thought it was below 1, and within 12 months, it was close to 3, and we were off to the races and ended up with 2.9 percent inflation.

MR. TARULLO. Right. But, with the exception of that, for almost all of the period from the financial crisis until today?

MR. LACKER. Was I worried about downside risk?

MR. TARULLO. Yes.

MR. LACKER. Sure. We all were.

MR. TARULLO. Okay. Thank you.

CHAIR YELLEN. Two-hander—President Bullard.

MR. BULLARD. Madam Chair, Brexit has been brought up, and it's a vote on a particular day. Is it feasible to think about calling a meeting after the Brexit vote and making the decision at that point?

CHAIR YELLEN. As an intermeeting move?

MR. BULLARD. Intermeeting, yes. If we felt like we wanted to go, but we wanted to see the outcome of the Brexit vote, then you could have a meeting after the Brexit vote. Is that something to consider?

CHAIR YELLEN. My mind isn't closed on it, but it would suggest a level of urgency. We will be meeting in July and have an opportunity then. I don't quite know what message it would send that we felt it was utterly urgent to have an intermeeting move. But it's obviously not impossible.

MR. BULLARD. Okay. Thank you.

CHAIR YELLEN. President Bullard. It's your turn.

MR. BULLARD. Oh. I guess I didn't need this two-hander.

MR. POWELL. You two-handed yourself. It's illegal. [Laughter]

MR. BULLARD. I didn't know I was violating the rules. Thank you, Madam Chair. I support alternative B for today. My remarks are concentrated on the June meeting. I think we're in poor position for June even though many around the table have penciled in an increase in the

policy rate at that meeting. Financial markets at this juncture are putting only a 20 percent probability on a move. That implies a substantial uphill climb in the next six weeks or so in Federal Reserve communication. The data are running against a move as of today, the trade report this morning notwithstanding.

My view is that if we do not move in June, our normalization program will be paralyzed and our credibility on this issue will be significantly damaged. The conclusion of financial markets may be "Do not listen to the Fed." This may make the FOMC policy less effective in the future. At the June meeting, we will be 18 months past the end of QE in the United States. During that period, we will have raised the policy rate once, and just 25 basis points. We have no current plans to reduce the size of the balance sheet. I do not think it is meaningful to say that we are normalizing interest rates at a pace of 25 basis points per year, which is what we would likely be doing if we do not move in June. This sort of pace is so slow as to be essentially meaningless. It would take four years to raise the policy rate 100 basis points at that pace. This pace is also well outside the historical experience on which our econometric estimates of the effects of monetary policy are based.

I think it is very awkward for the Committee to present an upward-sloping median policy rate dot plot to the public but then constantly cite downside risks to the U.S. economy. In the past, if the Committee was thinking about raising the policy rate in the future, it was because upside risks existed, which, if the Committee did not react to them in an appropriate way, could lead to mandate-inconsistent outcomes. This seems to me to be one element of our current policy that is causing considerable confusion in global financial markets. In short, I think we need a plan. We need to change our messaging to better fit the situation in which we find ourselves. An advantage of changing our messaging is that we could get in much better sync

with financial market expectations and therefore cause less turmoil as we try to react to macroeconomic developments appropriately. In particular, I think our dot plot from December, combined with a weak spate of data in January and February, caused a lot of consternation internationally, and the method that I'm suggesting would help us get out of that kind of a loop.

My goal would be to get out of the box of projecting rate increases in the SEP, which can be interpreted as quasi commitments, and simultaneously citing downside risks, including global events, slower productivity growth, or low inflation expectations. I'm just putting this on the table as a suggestion, one part of which would be to eliminate the portion of the dot plot that gives forward guidance on the policy rate. This is causing more problems than it's solving. It is essentially announcing a relatively hawkish policy in a situation in which the Committee may well not be all that hawkish. This would force markets to pay more attention to the data and less attention to the dot plot. They wouldn't have a dot plot to look at, I guess.

Because we are now off the lower bound, we could use the idea that the policy rate could go up or down in the future. Communication could emphasize that, in light of all we know today, the policy rate is exactly the right level that the Committee intends it to be for today. A statement on risks would then emphasize whether the Committee saw the next move as more likely to be up or down. We could stress that if inflation develops, we will raise the policy rate commensurately. This would be more consistent with how the Committee has behaved in the past and how the Committee has used the statement of risks in the past. If we adopted this approach, we could still normalize in about the same way that we currently expect, but without constantly sending out the hawkish signal that comes out of the upward-sloping SEP median. We could also do so in a way that is more consistent with the historical practice of the Committee. We could get rid of the dynamic that announces a relatively hawkish policy for the

period ahead through the dot plot but tempers that policy by citing downside risks in speeches and Committee communications. The risks statement would become something closer to what it was historically.

The bottom line is, I think the Committee is at substantial risk for the June meeting, and better messaging would possibly be very helpful for managing U.S. monetary policy. We would very much like to, I think, better align policymaker expectations with market expectations. My suggested changes might be helpful in this regard, and perhaps we could think about them in the next several weeks. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Lockhart.

MR. LOCKHART. Thank you, Madam Chair. I support the policy recommendation in alternative B and the statement as written.

Coming out of the March meeting, my position was that the April meeting should be kept alive for a rate move if the incoming data proved to be largely confirming of a beginning-of-the-year real-side outlook of moderate economic growth between 2 and 2½ percent, provided that growth momentum was accompanied by continuing strength in labor reports and evidence of inflation firming. The economic growth signals have not been confirming that outlook, although the employment and inflation data have mostly cooperated. So I have backed off any inclination to move at this meeting. I advocate a wait-and-see posture. I believe June ought to remain a live option, and I'm satisfied that the language in alternative B adequately preserves that option.

Unfortunately, as the data calendar presented in Bill Wascher's presentation yesterday shows, there will not be a lot of information on hand on second-quarter economic growth by the June meeting. And, to state the obvious, as everyone has mentioned, the pending Brexit vote has the potential to be a very significant event. So I think we could be facing ambiguous

circumstances again in June. If progress toward the Committee's mandated objectives moves along with even soft, below-forecast economic growth—below 2 percent—and otherwise mixed incoming data, policy-setting in conditions of ambiguity may be our curse for a good while. Circumstances may force the Committee to more explicitly explain its reaction function as regards normalization and, as a participant, may force the question of my preferred policy-setting decision framework.

The approach I expect to apply is to test my baseline assumptions against accumulated incoming data, looking for evidence that invalidates those assumptions. This is a lower bar than requiring an improved and broadly affirmative constellation of data that sounds the all-clear. I'm concerned we will always have some reason not to act, and, although I perceive little potential cost associated with a patient, wait-and-see posture, at this moment I doubt we can rely on such conditions indefinitely. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Kashkari.

MR. KASHKARI. Thank you, Madam Chair. I support alternative B, and I share the Tealbook baseline outlook of continuing employment gains and inflation slowly picking up. Under that outlook, a very gradual path for the federal funds rate seems appropriate. As I said in March, I believe that, while inflation remains low, it's appropriate for the Committee to keep rates low to support continued job creation, especially as recent job gains reflect rising labor force participation rather than a falling unemployment rate.

When I think about June, I think about two communication challenges. One is changing market expectations in advance of such a move; as you said, you have a speech coming up when you can do that. The second communications challenge is really the data. We've said that we're data dependent, and if, between now and June, we haven't seen a move in inflation or inflation

expectations and if we haven't seen a move in wages or in the headline unemployment rate, how do we explain the move? I struggle with being able to point to data in any of our key indicators that would justify the move, so that's something I'd like us to think about.

CHAIR YELLEN. Thank you. President Evans.

MR. EVANS. Thank you, Madam Chair. I support alternative B. Both my December and March SEP paths assumed two funds rate increases sometime in 2016. I'm sticking with that assessment today.

My outlook for economic growth over the remainder of the year is basically on track with my earlier forecasts. Here the improvement in financial conditions we've experienced since midwinter is an important factor. Otherwise, I would have carried some of the first-quarter weakness into my outlook for the remainder of the year. The incoming data have also led me to stick with my March inflation forecast, which had the four-quarter change in core PCE prices in the fourth quarter of 2016 at 1.6 percent.

I do not think, however, that one of those two policy moves should occur today. First, I prefer waiting until the incoming data on spending corroborate my forecast of recovering economic growth. Second, the improvement in financial conditions supporting my forecast is due in good part to the more accommodative policy rate path that markets began to expect during the winter and that we delivered on in the March SEP. We should not hazard undoing that welcome support, especially at a time when the risks to both the economic outlook and inflation forecasts are tilted to the downside and our policy rate is still close to the effective lower bound.

For today, I believe alternative B serves us well, and I support it as written. It clearly communicates our assessment of appropriate policy, in view of the outlook and surrounding risks, for achieving our dual-mandate objectives. Furthermore, in view of the uncertainties and

risks, at the moment I think we should be agnostic about when the next rate hike is likely to take place. Alternative B as written neither commits us to a move soon nor takes June off the table, and I think that's a good place to be.

Because President Bullard mentioned his lack of support for the dot plot, I just want to register that I support the dot plot very strongly. Without it, I think our statement would need to convey a much better, stronger consensus view of our policy expectations, and that's historically been difficult to accomplish within our statement. The dot plot adds more information, all of this at a time when the ultimate renormalization would be on the order of 250 to 300 basis points eventually. I think that's tough. If we took it away, we'd have to replace it with something, and, in the past, we've talked about constructing a consensus forecast. I'm not optimistic about our ability to deliver on that, but it would be an alternative. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Kaplan.

MR. KAPLAN. Thank you, Madam Chair. I support alternative B. Between now and the next meeting, I'm hoping to see evidence—jobs growth, PCE data, and other measures—that is more consistent with my GDP forecast of approximately 2 percent growth for 2016. I do believe we will see that improvement, in light of the strength of the consumer and the strong jobs market, but time will tell. While I remain concerned about risks outside the United States, I also believe that the FOMC's slowing of its expected pace of rate increases as well as firming prices of oil have helped stabilize financial conditions and have helped ease the adjustment process that's going on in China and other non-U.S. countries.

Assuming I see firming economic data, I will likely be advocating that we remove some amount of accommodation at our June meeting. And I believe that if we see that firming in

incoming data—even though we won't have a GDP estimate—market expectations of a June move will rise. So I think the data may, to some extent, help resolve that issue.

I would like to see any removal of accommodation be slow, gradual, and cautious. In that regard, I would like to have the option of waiting more than a quarter to observe the effects of our next move. So, to me, moving in June is attractive because it would give us the time needed to be patient and assess the effect of that move, and I think it would give us greater options with regard to moving at least a second time this year. In my view, waiting beyond June reduces our options.

I'm also mindful that the world is very different—to me, at least—than it was 10 years ago, particularly because of key secular forces, which I've talked a lot about: overcapacity globally, aging demographics, and high levels of debt to GDP in advanced economies, which, all things being equal, tend to put downward pressure on potential GDP growth and inflation. In a world that is more interconnected than we had even 10 years ago, the transmission of these forces affects the U.S. economy and has a greater potential to spill over into overall financial conditions.

To me, all of that reinforces the desire to have a slow, gradual, and cautious removal of accommodation. That said, I remind myself that there is a cost to excessive accommodation. It hurts savers. It creates distortions in investment decisions, some of which we talked about yesterday. It affects asset allocation and hiring decisions. And some of these imbalances can be painful to absorb and unwind and are easier to recognize in hindsight. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Harker.

MR. HARKER. Thank you, Madam Chair. In view of the recent near-term weakness in economic activity, I am supportive of no change in the funds rate at this meeting. Inflation

remains below target, and some patience is called for as more data allow us to better assess whether current economic weakness is largely transitory, perhaps partly driven by residual seasonality in the data, as mentioned yesterday. But as I noted yesterday as well, my modal outlook is for economic activity to grow slightly above trend and for inflation to return to target relatively quickly.

If this outcome transpires, then it will be appropriate to continue on the path toward normalization at the June meeting. Doing anything else would most likely require an entirely new narrative. However, if market probabilities of a June increase do not rise from their exceptionally low levels, then raising rates in June will be made unnecessarily difficult. Thus, the language in the statement is of paramount importance, and I am skeptical that the language in alternative B is up to the task. I prefer paragraphs 1 and 2 in alternative C, which give a more upbeat view of the economy. That said, we will have significant amounts of new data between today and the June meeting, and there are other avenues of communication that can and should be used to influence market sentiment.

So I can support alternative B as written for today. Monetary policy is quite accommodative and, as emphasized in the Tealbook, will still be accommodative in the event of a few future rate hikes. If economic data come in much weaker than I envision or if inflation retreats from its firming trend, then, of course, no rate hike will be called for. But in order for monetary policy to normalize in a predictable and coherent way, all meetings must be "live." And our statement language must ensure that this is the case. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President Mester.

MS. MESTER. Thank you, Madam Chair. The unemployment part of our mandate has largely been met, and inflation is gradually moving toward our goal of 2 percent. In my view,

risks to the outlook are roughly balanced. Although economic growth remained sluggish in the first quarter, the signals from the labor market continue to be quite strong, and those have proven to be more reliable as the economy has continued to be resilient through financial market volatility, the drop in oil prices, the higher dollar, and relatively weak economic growth abroad.

With that as backdrop, I believe it's appropriate for the federal funds rate to continue to be on a gradual upward path. Even considering that estimates of the short-run equilibrium real rate are still very low, monetary policy is very accommodative, and I expect it to remain accommodative for some time because the anticipated pace of normalization is slow. Thus, policy will continue to provide some insurance against downside risks even as we implement gradual reductions in the level of accommodation to provide some insurance against the upside risks.

I do not think the FOMC is "behind the curve," but while there are risks associated with moving too soon, there are also risks associated with waiting too long, on account of the lags with which monetary policy affects the economy. If we wait until every piece of data lines up or all uncertainty is resolved, then we will surely have waited too long.

We should have the courage to act when the economic outlook calls for it, as I believe it currently does. And if the economy evolves in an unexpected way, we should have the courage to change course if necessary. I view that as essentially the meaning of running policy in a data-dependent way. Data dependency was meant to give us flexibility so that we could react appropriately to evolving economic conditions, but, in reality, I think it has actually come to constrain our flexibility. It hasn't given the public enough indication of our own reaction function. It has not helped the public understand the economic considerations that will drive our policy decisions this year and next.

At the same time, we don't want to act in a way that surprises the public. Thus, we're at an impasse. The public is not expecting us to raise rates at this meeting, and the policy rate path that market participants currently anticipate is quite a bit shallower than the path we've indicated in the March SEP as most likely to be appropriate. As long as we are ineffective in conveying our interpretation of economic developments and the outlook, the market's policy expectations need not align with ours. If we are, then, unwilling to act in such a situation, we have essentially ratified the market participants' expectations and not our own.

I can go along with alternative B today because we haven't prepared the public for anything else, but I would like us to be in a position to raise rates in June because of the actual progress we've made on our dual-mandate goals. That means we need to be working on our message throughout the intermeeting period. Conditional on the economic outlook, my operating assumption is that we will likely raise the funds rate in June, and only if we get some negative surprises would we back off from that.

We'll need to start preparing the public. Unfortunately, I don't think today's statement is going to be much of a help. Indeed, I think it could very well be read as indicating a lower probability of a rate increase in June, because the statement is silent on whether we view risks as having receded since March and because the tone of paragraph 1, in which most of the changes appear, could be read more negatively than intended. I appreciate the Chair making a speech the day before the next blackout period, but I hope the Chair will take on the burden of speaking publicly throughout the intermeeting period to ensure that we do indeed have the flexibility to raise rates in June should the economy evolve as expected. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. President George.

MS. GEORGE. Thank you, Madam Chair. Since the March meeting, potential downside risks have softened or shifted but, of course, not entirely disappeared. With financial conditions calmer, however, my modal outlook is unchanged from our March meeting, and I see current economic outcomes as well aligned with our mandated objectives. Labor markets are near maximum employment. Prices are rising at a rate commensurate with the economy's longer-run potential. In this context, I see economic fundamentals consistent with a 25 basis point rate increase at this meeting and consistent with a gradual and patient approach. My other concern with alternative B is that it seems likely to be read as placing more weight on transitory financial and economic factors and too little weight on our modal outlook for economic growth, employment, and inflation.

It is increasingly unclear what framework will guide our policy decisions. Policy rules appear to be carrying little, if any, weight. Tealbook B shows we are likely to be well behind even the prescriptions from the inertial Taylor (1999) rule for some time. However, many frameworks suggest that the equilibrium real rate is lower, though we seem reluctant to adjust the stance of policy in response to changes in the equilibrium real rate. For example, Tealbook B shows that the current real federal funds rate has fallen, while the Tealbook-consistent measure of r^* has risen. The widening spread suggests that monetary policy has become more accommodative since the March FOMC meeting during a period when conditions might suggest less accommodation would be appropriate. In fact, the spread between the Tealbook-consistent measure of r^* and the current real federal funds rate is at the widest level at any point, according to my staff's look at Tealbooks, over at least the past 10 years.

In addition, recalling the January 2015 Board staff memo that compared the "early and gradual" approach to normalization with the "late and steep" approach, it is striking to look at the

distribution of the funds rate under these two strategies. Our current policy setting is below or on the boundary of the lower bound of the 90 percent confidence intervals in either case. Yet current inflation and unemployment are well inside the 70 percent confidence bands. Certainly, the discrepancy reflects concerns about downside risks, although risks were viewed as balanced last December at liftoff.

Finally, the current Tealbook offers another framework, one that attaches asymmetric losses to the unemployment rate gap. This approach takes the projected path closer to what is implied by the current SEP projections but still suggests a slightly faster removal of accommodation.

Essentially, none of the frameworks align with our policy settings. As we approach the June meeting, I would like to see our policy choices begin to align with such decisionmaking frameworks more closely. Thank you.

CHAIR YELLEN. Thank you. President Williams.

MR. WILLIAMS. Thank you, Madam Chair. I support alternative B as written. The statement sets us up to react appropriately at the upcoming meetings to the incoming data on labor markets, economic activity, and inflation.

Since our March meeting, concerns about global economic and financial developments have ebbed. Therefore, I think it's appropriate that paragraph 2 no longer puts a spotlight on these as specific sources of risks. Indeed, as we think about future policy, changes in the outlook for inflation are particularly important because we're already essentially at or very near our full employment goal. Alternative B correctly emphasizes that we'll closely monitor both inflation and global developments.

I recently looked back at my forecast and the Tealbook's forecast from a year ago, April 2015. For both core inflation and unemployment, the economy is currently very close to the path that we forecast a year ago. In fact, the main miss is core inflation over the past year, and, in the current quarter, it's been just a tad stronger than expected a year ago. The fact that the expansion remains on track gives me confidence that we can and should soon make another gradual move to normalize the federal funds rate. In addition, there are potential risks to waiting too long, as our discussion yesterday of monetary policy and financial stability highlighted.

In light of these considerations, I like to think ahead about the statement language that may be used when we raise rates. Alternative C is a good starting point. One concern, though, is that paragraph 2 of alternative C mentions the balance of risks for economic activity and the labor market but not for inflation. It would be good to emphasize the risks to both of our mandate goals, and that's easily remedied by moving the risk assessment to the end of paragraph 2 and then being symmetric about the two parts of the mandate. For example, we might say, "The Committee sees the risks to its outlook for both economic activity and inflation as nearly balanced but is monitoring inflation indicators and global economic and financial market developments closely." Thank you.

CHAIR YELLEN. Thank you. Governor Powell.

MR. POWELL. Thank you, Madam Chair. I will support alternative B, and I support the statement as written.

My base case is that we should proceed with a gradual pace of interest rate increases, including probably two increases this year, provided that the economy continues on its projected path. As for June, if we have two more months of continued labor market progress and some

indication of a brighter picture on spending, then I could support another rate increase as soon as June.

I have to say that, sitting here today, the question of whether to move in June strikes me as a particularly tricky one for two reasons. First, U.S. and global financial conditions are significantly improved since early February, and that is due, in large part, to the perceived shift in U.S. monetary policy, which was validated by the March SEP. I would like to see things come together for an increase in June. I'm not at all certain that they will. And that's partly because of the data that are incoming, as President Lockhart indicated.

The second thing is Brexit. There was a lot of discussion on it yesterday and some today. The June meeting ends on June 15, eight days before the Brexit vote. As of June 15, the result of the Brexit vote may or may not be in serious doubt, and markets may or may not be in turmoil over that. So I'm just saying I can imagine circumstances in which I would think it risky to proceed with another rate increase, and I can also imagine circumstances in which it might be safe, assuming the data also justify it.

I would not want to tighten going into a situation in which it's highly uncertain what's going to happen. I think we don't need to be in that kind of a hurry. So I'll leave it there. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Governor Fischer.

MR. FISCHER. Thank you, Madam Chair. I support alternative B. The probability that we will raise the interest rate in our June meeting is likely lower today than the parallel probability for a December 2015 increase was at our October 2015 meeting. I regard today's probability as somewhere around 40 percent.

Obviously, our decision on June 15 will depend on what happens between now and then and on our expectations of the development of the U.S. economy and the global economy in the months and years following June 15, 2016. Our decision will depend, to a considerable extent, on the conclusions we will have reached by then about economic growth in the fourth quarter of last year and the first quarter of this year and on the implications of those conclusions for the growth of the economy in the remaining three quarters of this year. And that conclusion will depend, to a considerable extent, on whether the labor market continues to strengthen.

Before our next meeting we will receive two employment reports, on May 6 and on June 3. The probability that we will want to raise the rate seven weeks from now will be higher if these reports confirm the basic dilemma we've had to deal with for well over a year—that the labor market is strong, while economic growth is disappointing. I continue to go with the advice to focus on the labor market, which I was given soon after arriving here.

Of course, there'll be many other factors that we'll take into account when we make the next interest rate decision, among them current and expected rates of inflation and wage growth and current and expected exchange rates. But there's no point at this late stage in our discussions in trying to summarize our collective reaction function not only in terms of the arguments that enter our explicit or implicit monetary rule, but also in terms of what determines our beliefs about that rule and about future values of those arguments.

So, to save time, I'll conclude by mentioning only two key issues, both of which have been mentioned several times already in this discussion. The first is the message we want to send about the probability of our raising the interest rate on June 15. Probably most of us prefer not to surprise the markets, at least unnecessarily. If that is our approach, we need to raise the markets' estimated probability of an increase in June. That could be done both through today's

statement and by messages that we send in the next seven weeks. I do not think that alternative B will send the message that I believe conveys the right probability. And if our aim is to not create surprises, we should not wait too long to send the message that the probability of an increase in June is well above the 20 percent number we've heard several times this week. I hope that the statement and, in particular, the minutes will be useful in this regard.

Second, we confront the issue of what to do about the possibility of Brexit, which was discussed yesterday by several people, including in some detail by Vice Chairman Dudley, and again today by others. In principle, the way we should handle the Brexit issue seems clear. If the odds on Brexit are low on June 15, we should go ahead and make the decision on the interest rate, ignoring the possibility of Brexit. If the odds on a "leave" Brexit vote result are close to or above 50 percent, we should delay our decision on the rate, particularly if the tentative decision would have been to raise the rate, until the July meeting. This has one extra advantage. That could be the ideal occasion to show that, in practice, all of our meetings are live—that is to say, we really can make an interest rate decision at any meeting. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Vice Chairman.

VICE CHAIRMAN DUDLEY. Thank you, Madam Chair. I support alternative B as written. I think we need to acknowledge both the weakness in recent economic activity, which I believe we do in paragraph 1, and the fact that financial conditions have improved so that the downside risks arising from this source have diminished somewhat, and I think the changes in paragraph 2 address this.

Unlike some others, I expect the statement will be viewed as slightly on the "hawky" side, in view of the elimination of the "continue to pose risks" language. How much so is difficult to tell. I don't read the statement as indicating a bias one way or another about June.

But with the market expectations for June at only about a 20 percent probability, it seems to me this statement, even if it really is not indicating a lean to June, should push the probability up a little bit, and I view that as a good outcome.

Yesterday I discussed the Brexit issue. I'm pretty much where Governor Fischer is on that. I think that if it's obvious at the next meeting that we would like to tighten ex Brexit and the probability of Brexit is low, we should just go ahead. But if the probability of a leave vote is high, then it may very well make sense to wait.

I do think that there is an option to potentially have a very hawky statement in June and then make it clear in the press conference that we're very close to tightening monetary policy, setting up the expectations that the July meeting would be live. And I agree with Governor Fischer that tightening in July has some other attractions, because it would eliminate this idea that we can tighten only at press conference meetings. Thank you, Madam Chair.

CHAIR YELLEN. Thank you. Well, I think I've heard broad-based support for alternative B for today and heard many of you emphasize the importance of communications between now and June. And if we see a divergence between what markets think and what views are developing in the Committee, I will be very attuned to try to remedy that.

For today, let me ask Brian to call for a vote on alternative B as written and the associated directive.

MR. MADIGAN. Thank you, Madam Chair. As you mentioned, this vote will be on the policy statement for alternative B as indicated on pages 6 and 7 of Thomas's briefing materials and on the directive to the Desk as included in the implementation note on page 10 of those materials.

Chair Yellen	Yes
Vice Chairman Dudley	Yes

Governor Brainard	Yes
President Bullard	Yes
Governor Fischer	Yes
President George	No
President Mester	Yes
Governor Powell	Yes
President Rosengren	Yes
Governor Tarullo	Yes

MR. MADIGAN. Thank you.

CHAIR YELLEN. Okay. Thank you.

VICE CHAIRMAN DUDLEY. It's a new record.

CHAIR YELLEN. Well, it is a record, and while I'm an early eater for lunch [laughter], I think we're pushing it.

The date of the next meeting is Tuesday and Wednesday, June 14 and 15. Linda Robertson is prepared to give us an update on legislative affairs, and lunch will be available at 11:30 for those of you who want to stay. The meeting is adjourned at this point, and Linda is welcome to begin whenever she'd like.

END OF MEETING