CHAPTER NINE

Policy Panel

James Bullard, John H. Cochrane, Charles L. Evans, and Eric Rosengren

JOHN COCHRANE: I'd like to welcome everyone to the policy panel. This panel is an emerging tradition of this conference. We sum up and think about how the big issues we have discussed affect policy. I'd like to welcome our guests: Jim Bullard from St. Louis, Charlie Evans from Chicago, and Eric Rosengren from Boston. I'm going to tee up some questions. They won't be big surprises: I'm going to ask our panelists their views on the themes of this conference, and how they see the discussion going in the policy community, and the FOMC. I'll then ask if there are an important questions that I've left out, and their answers. Then we'll move on to questions from the floor. We not only have current reserve bank presidents and FOMC members here, but we have some people who have been on the FOMC or run a bank previously. I'll give them the first shot at comments and or questions. Then we'll go to general Q&A.

Let's start where we started the conference: the balance sheet. What's the new normal for reserves? Should the Fed keep a big supply of interest-paying excess reserves? Should it further open access to reserves to nonbanks? (The reverse repo program essentially allows financial institutions that are not banks to hold interest-paying reserves at the Fed.) Should the Fed run monetary policy as it used to do, with a very small amount of non-interest-paying reserves? Should we continue as now with a trillion dollars in reserves and paying interest on excess reserves? Or how about my wide-open balance sheet: to set interest rates at 3 percent, say to banks and financial institutions, "Come and get it. Give us your Treasuries and we will give you 3 percent (say) on reserves"? Should the size of the balance sheet be a separate tool? Should we do more quantitative easing (QE) in the next recession? That's the liability side of the Fed's balance sheet. The asset side poses interesting and novel questions: Does quantitative easing (QE) work? If you think it does, does it do so on the asset side, by buying up bonds, mortgage-backed securities, and other assets, and so driving prices up, or on the liability side by "printing money"—by forcing the system to hold more reserves? What kind of assets should the Fed buy? Do you welcome restrictions, or precommitments (two words for the same thing)? Or should the Fed buy widely, among long-term Treasuries, mortgage-backed securities (MBS), corporate bonds, stocks, commercial paper, or whatever else the Fed seems to think needs buying?

CHARLES EVANS: There's so much there—I'll just take the one that I have the strongest opinion on. Our balance sheet is very large. Everybody recognizes that. And nobody expects that we're going to keep the balance sheet at $4.5 trillion, which is its current level. The committee has indicated this through various communications. Of course, the balance sheet is not going to be as small as it was back in 2007, at a minimum because the economy has grown and there's more currency out there. But we have not yet decided how big the balance sheet will be in the long run. Our communications have been pretty clear in describing the committee's deliberations over the various issues. We're actively discussing the benefits of a larger balance sheet that could be consistent with a floor system for some financial stability reasons versus perhaps going back to the previous model, in which reserves were scarce and we had an active interbank market. Given my twenty-five years in the Fed, there are times when I have some sympathy for the old model. Certainly a large balance sheet does open you up to political interests weighing in on its use. And Congress could pass a law directing you to do something particular with it. That is democracy: Congress can pass laws. I don't know where we'll end up, but the committee is thinking about the issue.

JAMES BULLARD: I agree with Charlie that the $4.5 trillion level that we're at now for the size of the balance sheet is larger than we'd like. So I've been an advocate of beginning to shrink the balance sheet by ending the reinvestment policy. I think we could go as low as $2 trillion, because the currency is about $1.5 trillion, and a couple of hundred billion for reserves would probably get you down to a floor system, although I wouldn't be firm on that. That gives you an idea on how far away we are from where we'd need to be, even if you wanted to run a floor system. I think we have a long way to go and we might as well get started.

One of the questions is, Would there be QE in the next recession? I think that's a distinct possibility. Therefore, the prudent thing would be to create policy space on the balance-sheet side like we are doing on the policy-rate side. If a future committee wanted to contemplate that kind of policy if we hit the zero bound in the future, they'd be able to do so. I also think we have a rather odd "twist operation" going on. We're raising the policy rate and therefore trying to normalize conditions, but we haven't changed the balance sheet. According to our rhetoric and our statement, that balance sheet is putting downward pressure on long- and medium-term yields. It's a bit odd to be saying we're going to raise the short-term rate, which would normally be thought to raise everything along the yield curve, all else equal. Nevertheless, we're putting downward pressure on other parts of the yield curve. I think that's an inconsistency that needs to be ironed out. That's another reason why I've advocated that we get going on balance-sheet normalization.

On whether QE works or not, I would challenge people here because a lot of times you get people saying that QE didn't have any effect. I think I heard John Cochrane sort of say that yesterday. Let me push back on that a bit. I think you have a distinct set of empirical facts associated with QE, and any theory has to explain these facts. We have experiments in Europe, in the United States, and in Japan, and it seems pretty clear what happened. Equity prices react a lot. You have big movements in exchange rates: we saw that in 2014 with the euro, and we saw that in Japan. You also saw important effects on term premiums and long-term interest rates. And then, puzzlingly, for me anyway, not much effect on inflation or on inflation expectations. So whatever theory you choose, I think it has to confront those facts. They aren't easy to confront in a model. So some people say it didn't do anything. It did something, but it's maybe not something as conventional as we thought it was.

ERIC ROSENGREN: I'll just follow up on a couple of things Jim talked about. One was his question about the likelihood that we could see a swollen balance sheet again. Clearly, the system design has to incorporate what you think about what's occurring right now—whether you think it's a one-time event or it's likely to occur more frequently. I think it is important to note the Summary of Economic Projections (SEP) by FOMC participants, which suggests that policy makers think we'll have a long-term federal funds rate around 3 percent. Combine that with how the Federal Reserve normally responds to a recession, where it's not at all uncommon to lower the federal funds rate by five hundred basis points. So if you have three hundred basis points in the longer run for the federal funds rate, but you need to go down by five hundred basis points, it means that you're going to hit the zero lower bound pretty frequently in easing situations.

Why is it that we're likely to be at the zero lower bound more frequently? I think there are several reasons. One of the benefits right now is we do have a low, roughly 2 percent inflation rate. And I think inflation expectations are getting to be well anchored. During previous periods, we had a much higher inflation rate. I don't think that's a desirable thing. But the result is that there's less of a buffer between where the nominal interest rate is and zero. Furthermore, it's not just the United States that's encountering this. Japan is experiencing it, and so is Europe. In terms of other trends, population growth is much slower than it was a few decades back. That's true in the United States. It's true in Europe. It's true in Japan. It's not only slower births but less immigration, and that seems likely to continue.

Concerning productivity trends, I agree with Kevin: we don't completely understand why productivity growth is as slow as it is, but it seems to be relatively slow. So you combine a low population growth, low productivity, and a 2 percent inflation rate, and it's not surprising that much of the committee comes up with a number around 3 percent.

So as I said, that means we are going to be here—approaching zero—pretty frequently. And if we're going to be here pretty frequently, we need to come up with a system design that is well equipped to address what we are going to do when we come up against the zero lower bound. So I personally think it is inevitable that we're going to be talking about the balance sheet expanding in future recessions—actually in most recessions, unless they're very, very mild.

JOHN COCHRANE: Let me push you guys a bit. I presume you view QE as working not so much by the issuance of reserves but by asset purchases. You heard Charlie Plosser in our first panel, warning about the political pressure to buy certain assets rather than other assets, and political pressure to prop up certain prices rather than other prices. You're taking credit risk and term risk onto the balance sheet. Does that worry you at all? Or do you favor just a pure Treasury strategy? Or do you think it's actually the reserves that matter, not the purchases anyway?

ERIC ROSENGREN: So the political economy question certainly worries me. I think it is a significant issue. But we have to deal with the reality—if you're going to have a fed funds rate that's 3 percent and recessions occur, what are you going to do when you hit the zero lower bound? So you need an alternative. In Europe, they've tried negative interest rates. There's probably a limit to how negative rates can be—at least until we get some of the new currencies that were talked about in the previous chapters, but I don't think that's likely to happen in the near term. So we need an alternative that reflects what we're going to do when we do hit the zero lower bound. As I said earlier, in discussing what the Federal Reserve should do, we should recognize that it is possible we will be confronted with a situation where inflation's below 2 percent, the unemployment rate's very high, and the short-term interest rate is at zero.

Importantly, I do think there is a fair amount of empirical evidence that the large-scale asset purchases did make a difference. The long-term Treasury rates did move down. And I think you can look at even more recent experience, as in the United States we've gotten closer to normalization and stopped the purchase program, but the Europeans and the Japanese have not. Their ten-year government bonds are at rates much lower than our ten-year Treasury, and I don't think it's necessarily because they're viewed as much better credit risks than the United States. I think part of it is that they have a very different monetary policy than we have right now.

When I give talks, particularly to financial audiences, they spend much more time asking me about the balance sheet than they do about the federal funds rate path—which tells me that at least financial market participants think it matters. I think there is a fair amount of empirical evidence that the balance sheet has had an effect. I do think it lowers long-term interest rates, and I think it had an impact on the economy, and I think it is one reason why the United States is at full employment or possibly a bit below, and why inflation is pretty close to 2 percent. And those countries that waited much longer before they engaged in quantitative easing are not nearly as far along as we are.

JOHN COCHRANE: Is this something that needs a strategy, a plan, a rule, for what assets you buy and when you buy the assets? Or is it "Well, we'll go into the firehouse and pull out whatever we think when the time comes"?

JAMES BULLARD: I think the near-term challenge for the Fed is to realize that we're probably going to have to at least have QE available in the future. I think we should be creating policy space for that. My near-term goal for Fed strategy is to incorporate QE into the Fed's arsenal without bringing up the political economy problems that people have outlined here, which are very serious.

CHARLES EVANS: First, with regard to what we might buy, we are constrained in the assets we are allowed to purchase. We cannot buy equities; we can't take on risk like that. The Federal Reserve Act doesn't allow us to. The Federal Reserve's assets have to be safe. So we buy only Treasuries and mortgage-backed securities (MBS). There is no great credit risk with these purchases. If our MBS defaulted, we would get paid back by the guarantees the government-sponsored enterprises provide.

Second, what about when to buy? I'm not looking forward to any future episodes at the zero lower bound. However, I think it's extremely important that we make sure we can hit our policy objectives. So we need the ability to act the way we're supposed to if we find ourselves threatened with the ZLB. I'm with Ben Bernanke on this. He has said—and he's a scholar of the 1930s Great Depression—that if you look at the shocks that hit the system during the Great Depression and the shocks that hit the US economy after Lehman, the latter were bigger. The unemployment rate during the last crisis was horrible at 10 percent—but it wasn't 25 percent like during the Great Depression. I think this was because of all of the efforts the Fed undertook in conjunction with the administration: the liquidity programs, the stress testing, and making sure the banks had capital. And it also was because of the Fed's ability to provide stimulus through alternative tools, such as QE, once we hit the ZLB. We need to make sure we always have the capability to respond to adverse shocks. Of course, it would also be good to make sure we have the most vibrant economy we can, so that we've got inflation at target and we're at full employment, so that we would be less likely to face such a situation again anytime soon.

JOHN COCHRANE: I think that brings us to the next question, really, because you mentioned inflation. R-star. If indeed the long-run real rate is falling, how should the Fed adapt? I think Eric described the standard view: we keep the 2 percent inflation target. That means if real rates and r-star decline to 1 percent, we're going to end up at a 3 percent federal funds rate and probably run into the zero bound every recession. But I might channel Charlie saying that we need more headroom over the zero bound. We need to get the nominal rate back up to 4 percent or so, and that means we're going to have to raise the inflation targets, say to 3 percent. Or maybe, as discussed in the earlier panel, we need to rethink the whole business. Perhaps the Fed should think about changes in interest rates, raising them and lowering them in response to events only, and not the levels of interest rates at all. Or perhaps you have more extreme ideas, such as going to zero inflation, a price-level target, or a nominal GDP target. If this low real interest rate world keeps going, how do we adapt?

JAMES BULLARD: On r-star, the main failing of modern macroeconomics is the treatment of the trend. Even estimated models often say, "We're just going to take averages over long periods of time. We're going to relate those to the balanced growth path that underlies the model, and we're going to analyze fluctuations around that balanced growth path." From looking at history in the United States and across the globe, we know that these trends do change over time. In the model, any change in the trend would change the behavior of everyone in the model and would have to be taken into account. I've actually worked with models like that. They're not easy to work with. But from a policy-maker perspective, we understand that these trends might be changing.

One way to handle changes is to look at regime-switching models.[1] I like those because they keep some level of stationarity in the system, as opposed to a random walk. Let's say there's a high-growth regime and a low-growth regime. You might be switching very occasionally, for example, with ten years as the expected duration of a particular regime. But given the regime, everything behaves as if that would be the balanced growth path forever. To make monetary policy in that environment, you have to know which regime you're in.

I think this is a good conceptual way to think about r-star. Eric just outlined some things that you might think are lower today and higher in the past. Productivity growth is low today, while it was higher in the 1995–2005 period. Labor force growth was higher precrisis and lower postcrisis. Both would feed into this balanced growth path and, therefore, into the real interest rate associated with that path.

In addition, you've got a longer-run trend for increasing demand for safe assets that has been going on since the 1980s.

1. See J. Bullard, "The St. Louis Fed's New Characterization of the Outlook for the U.S. Economy," Federal Reserve Bank of St. Louis announcement, June 17, 2016, https://www.stlouisfed.org/from-the-president/commentary/2016/new-characterization-outlook-economy.

You had a period where there was a relatively normal demand for safe assets. Today, there's high demand for safe assets. That's pushing the safe real yield down as well.

I like this kind of framework. I think it keeps policy makers on their toes about what's actually going on in the economy, without disrupting the entire framework and saying that you can't do anything because you don't know what the state of the world is. I would be sympathetic to the idea that you could go with the growth-rate type policy rules, which would do a better job of tracking where you are in this regime-switching world, as opposed to simply assuming that you're always dealing with a constant balanced growth path.

ERIC ROSENGREN: We had a very good session earlier in the conference about estimating r-star. It's not observable. Of course, there's a big standard error around any kind of equation that economists run, but I'd say that r-star in particular has a fairly large standard error. So I agree with the empirical work that suggests it's quite uncertain. What we're seeing in productivity trends is a lot of uncertainty as to whether they'll continue or not. I don't think there's much uncertainty about what the population trends are going to be. The Fed doesn't get to pick productivity or population growth. And for those who want to make sure we don't do asset purchases in the future, I would suggest that they have to come up with an alternative for what we're going to do when we hit the zero lower bound.

Whether you think it's exactly 3 percent or not, it's clearly not 5 percent. I think it's pretty clear that it's not 5 percent—which means that in most recessions it's going to be a problem. I don't think the r-star estimation is really what's going to be driving whether we hit the zero lower bound. Because even though there's a pretty big standard error, as I add it up between what the inflation rate is, population growth, and productivity, it seems very likely we're going to hit the zero lower bound in most recessions.

So I think it is important to try to estimate it. It's a good policy tool. However, I don't think it's something that hinges on whether we're going to be using balance sheets in the future.

CHARLES EVANS: This is a wide-ranging question, so let me pick up on the different-ways-to-do-policy aspect. I tend to favor—especially given where we've traveled from over the last ten years—focusing on outcome-based policy. This encompasses making sure we have a long-run strategy that is informed by modern economic theory; this includes concepts such as the natural rate of interest and the thinking on it going back to Milton Friedman. Outcome-based policy also incorporates an inflation target, which is our price-stability objective. To execute our strategy, we focus on making sure we provide monetary and financial conditions to support full employment and price stability. We state what we mean by full employment—that's why we adjust our description of it in our long-run goals and strategy statement every year; that's a very natural thing to do. We also state our inflation objective and affirm that it is symmetric. Two percent is not a ceiling. We have to be willing to go above 2 percent periodically and also be below that. Following these elements of outcome-based policy is very important.

Now, this isn't necessarily just pure discretion. But it's also not following any one rule all the time. We need to use a range of models, and we have to recognize—as Kevin said—when those models have obvious shortcomings. Macroeconomics as a literature has had difficulty fitting models to the data for the postwar US experience to a first approximation. Some of the difficulties I see today are in modeling the financial and international sectors. So, when you're facing unusual circumstances—something like a tail risk—you need to be mindful of the fact that our standard models don't cover the situation well. We have to incorporate other analyses, and adding them in can be a very "artful" exercise. This can be quite uncomfortable if you're accustomed to, and would like to have, a nice single, unified model. But such a model doesn't exist. That's a statement about the profession, not just central banks.

Stan gave a very good talk this morning in which he mentioned that Don Kohn had said that the committee's been informed about Taylor rules and different alternatives going back as far as 1995. These analyses have been very useful. But I think you have to be mindful of tail risks. This means you need to make a judgment about when you should focus on something other than the center of the distribution. A policy rule is going to be focused on the center of the distribution. It tries to be robust against deviations, but if you're going to be serious about tail risks, you also need to be ready to say, "Now's a time when I need to do something a bit different." I think that's what the Bernanke Fed did in response to the financial crisis, with 10 percent unemployment and inflation not expected to get up to our objective anytime soon. I would note that the rest of the world was slower to get to that point than the United States, and they also lagged in the recovery.

JOHN COCHRANE: I want to press you on this. If the zero bound is a problem, why not raise the inflation target to 3 percent, so you've got more headroom?

JAMES BULLARD: Let me set you right on this. If you have higher inflation, you're distorting the economy all the time because of the higher inflation. So do you want to distort the economy every day so that on occasion you're able to conduct a little better stabilization policy? The literature has a clear answer to this, which is that the distortion caused by everyday inflation is much bigger—an order of magnitude bigger—than the benefits of the stabilization policy. That's the received wisdom from the literature. You could write down different models, but that's the way the debate should be stated. I don't think the additional benefits from better stabilization policy would outweigh the day-to-day distortion that would come from the higher inflation target, so I don't think that's a good trade-off. I also think there are things you can do at the zero bound, including quantitative easing. I have been an advocate. It's not perfect, but there are some things you can do. So it's not like you're out of ammunition when you're at the zero lower bound.

JOHN COCHRANE: Well, I'll take the answer I like and move on. I also notice you guys are taking productivity—and, thank goodness, population growth—as exogenous to the Fed. Whereas of course, there's an alternative story that it's secular stagnation, and the Fed should be doing more about productivity growth and labor force participation.

What are the lessons of the recent quiet period? Marty Eichenbaum had a very interesting graph. The Fed, along with me and it seems everybody else, got forecast after forecast wrong, expecting a robust recovery that never came. Marty used that fact to say that people are irrational expecters. But, of course, those were Fed forecasts. Maybe the Fed is an irrational expecter too? The Phillips curve fell apart. The deflation spiral never came. Growth is too low, but does that have anything to do with monetary policy? Or maybe we and Japan are just living the optimal quantity of money, and growth is too low for real reasons unrelated to monetary policy. In the end, the Fed achieved its objectives: low inflation, maximum employment—at least as much as monetary policy can give you—and tiny interest rates. Maybe the Fed should just have a big party? What lessons do you see from this recent, surprisingly quiet period?

ERIC ROSENGREN: I agree with what Charlie highlighted earlier, that monetary policy should be focused on outcomes. Inflation and unemployment are things we should definitely be focused on.

You've just stated a whole bunch of things that can change over time, where there's a fair amount of uncertainty about what values they are going to be at for any particular point in time. It really kind of reiterates Stan's comments earlier, about having a fixed policy rule. But if you think a lot of these relationships are uncertain and possibly changing, the last thing you'll want to do is tie yourself to a rule that might be wrong.

So we do have an ability to monitor what's happening with inflation and unemployment. I think actually that should be the focus of congressional oversight: when we're missing on both variables, that is a discussion we should be having. But I'm not sure having Congress or the GAO determine what goes into getting that outcome is particularly productive.

JAMES BULLARD: So the question is about the "quiet" zero lower bound. I would take the main lesson from this era to be that, to paraphrase Friedman, near-zero interest rates do not everywhere and always imply higher inflation. That's a puzzle I don't think the profession has come to grips with even now. It came out of left field. I don't think anyone expected that. If I had told most of the people in this room eight years ago where interest rates would be and what the size of the balance sheet and the monetary base would be eight years in the future, you would all have said, "I bet inflation is high, or at least higher than targeted." And you would have been wrong.

That has been a shocking development from the point of view of received economic theory. At the St. Louis Fed, we're kind of overachievers on providing new ideas, so we provided two possibilities on what's going on or what might be going on. One is to bring out the Benhabib/Schmitt-Grohé/Uribe type analysis and think about the possibility that there's another steady state.[2]

2. See J. Bullard, "Seven Faces of the 'Peril,'" *Federal Reserve Bank of St. Louis Review* 92 (September/October 2010): 339–52; J. Benhabib, S. Schmitt-Grohé, and M. Uribe, "The Perils of Taylor Rules," *Journal of Economic Theory* 96 (January 2001): 40–69.

That steady state is very robust across models, because it only relies on the idea that there's a Fisher relation, a Taylor rule, and a zero bound, most of which would be in any of our models. Maybe we're somehow getting stuck at that steady state, or you could interpret Japan as Benhabib et al. did, as getting stuck at that steady state. I still think that's a reasonable idea. I'm not sure you really want to bring it in as the focal point of monetary policy, but that's a reasonable idea of what has happened. And the other idea is neo-Fisherian. If you just keep the interest rate low for a long time—or a permanent peg, as John Cochrane has discussed—eventually the private-sector expectations of inflation will become consistent with the very low nominal interest rate, and inflation will simply come down.[3] That seems to be a good model for Japan as well: for twenty years the policy rate has been below fifty basis points, and not too much is on the horizon as far as changes. After a while, the private sector throws in the towel and says, "Well, I'm just going to expect the amount of inflation that's consistent with that level of nominal interest rates, given that the real interest rate has to be determined by supply and demand conditions in that economy." I'm not saying neo-Fisherian effects would immediately dominate. But if you're going to keep the policy rate in the same place for a long period of time, I can imagine that private-sector inflation expectations will adapt, as opposed to real output or other variables.

CHARLES EVANS: One thing Jim just demonstrated quite well is that he's been willing to bring different views forward to the FOMC: he has spoken about different growth regimes, neo-Fisherian thinking, Schmitt-Grohé and Uribe multiple equilibriums, and so on. I'll be honest: I don't always like it. You know? [*Laughter*] For example, the neo-Fisherian models get inflation up by increasing interest rates. That is kind of counterintuitive, and

3. See J. Bullard, "Permazero," speech delivered at the Cato Institute's 33rd Annual Monetary Conference, "Rethinking Monetary Policy," Washington, DC, November 12, 2015.

I'm not sure it's right. But I benefit from talking to my staff and having them educate me about these topics. We benefit by understanding where those results come from. Either you buy into it or you think, as we do with some results, "Oh, that involves a slavish devotion to the Taylor rule all the way down—into the deflationary spiral, through the gates of Hell, into Hades, all the way down and not stopping. Because if you stop, say, because you've got some threshold, then that's going to kill the transversality condition in the infinite limit, and then. . . ." Okay, we don't have to think about that anymore. But the point is that this type of exercise is a way of getting around the groupthink Kevin mentioned.

We also listen to alternative views from outside the committee. I have spent a lot of time talking about forward guidance and explicit thresholds as a means of communication to people who were skeptical about their usefulness. These people are like those in Marty's chart who always thought the funds rate would go back up because it always has. And every time I saw such a funds rate forecast, I thought, "We're not getting as much accommodation in place as we would like." So hearing these different views helped me realize we needed some forceful way to demonstrate our conditional commitment to keep interest rates low as long as we had to. And we had good committee discussions about this topic.

Yet another example is Eric's talk about financial stability issues and areas where we could run afoul, with financial exuberance leading to a large increase in unemployment. Those are risky propositions.

Anyway, I think all of these are good examples of the committee benefiting from a variety of viewpoints. And they dovetail with Stan's comments about different perspectives on the committee.

JOHN COCHRANE: I'm getting a sense that one response to Kevin's worries is that regional Federal Reserve Banks are an excellent antidote to groupthink and allow you to come up with alternative ideas to bring to Washington.

JAMES BULLARD: Let me just follow up on that. One of my favorite examples is Charlie Evans, so this is a mutual admiration society. Charlie came up with the idea of thresholds for policy. When he first gave the "thresholds speech," I didn't know what he was talking about—I had never heard of it or even thought that way. He stayed at it for about a year or maybe more. And lo and behold, that entered into actual FOMC policy. Now, if the chair had gone out and said something about thresholds, all hell would have broken loose. I think there are some advantages to having the big committee in a world that has been turned upside down; you do need new ideas to flow into the policy process, but you can't just spring them on global financial markets. You don't know what would happen. There are advantages to this system we have of allowing different viewpoints to be stated and trying out different ideas before they actually get into the full weight of policy making.

JOHN COCHRANE: Let me move on to some issues Kevin Warsh brought up in his talk. In public, the Fed talks a lot about point forecasts. What should we do, assuming the economy continues to grow and inflation stays low? What's the path of normalization? It's a very quiet scenario that we were talking about. It is full of questions like, Do we raise twenty-five basis points first, then slowly squeeze down the balance sheet later? Let us hope those are the problems we deal with in the future. There is a danger that this starts to feel like we're congratulating ourselves on the Great Moderation in about 2006. So let's talk about what could go wrong, about variance, about confidence bands, about bad scenarios. The Fed puts banks through stress tests. Surely there are stress tests for monetary policy too? Now, you may not want to talk about this in public, but what scenarios keep you guys up at night? What scenarios keep the Fed up at night? What are the Fed's internal stress tests about? How can we avoid being caught flat-footed once again when the next truly unpredictable but in retrospect it-looked-predictable crisis comes? Do you worry about China blowing up? The euro blowing up? The United States blowing up? Some sort of sovereign default? Banks, student loans, state pensions? What are you thinking about for where the next crisis might be and what the Fed might do about it. In some sense as long as inflation stays under 2 percent, that's not really a big worry, and crisis management is much, much more what the Fed's about. What keeps you up at night?

ERIC ROSENGREN: I'll answer the first part about stress tests. With the Teal Book, we have different scenarios that we look at. We look at scenarios where there are unanticipated shocks—for example, something happening in China or Europe that we didn't anticipate—and also the uncertainty about economic relationships. For example, maybe we have a very different set of economic relationships than our standard models are telling us.

And so, the staff normally puts together four or five of those kinds of scenarios. That is part of the discussion at each of the meetings. My own staff also goes through various scenarios that they think might be relevant. Those scenarios change over time depending upon geopolitical situations, depending on which economic relationships are breaking down.

So I would say we do think about various scenarios. We tend to be focused on the modal forecast because it's much easier to explain the modal forecast than it is to explain standard errors, fan charts, and all the uncertainty that revolves around these relationships. But these are things that we do around every meeting. So if you go back five years, where you can see the Teal Books, part of that discussion includes these various scenarios.

And at each meeting, the scenarios change as different economic data come in.

So in sum, I completely agree with you that we should be spending a lot of time thinking about what goes wrong. Those things change over time, and that is something we take into account when we have our deliberations.

JAMES BULLARD: I agree with Eric. We do scenarios, and I think it's a good thing. We definitely look at what if productivity comes in lower than we think? Or what if various shocks hit from around the world—China hard landing, things like that? But let me just elaborate a bit.

I don't think what we do is sufficient, so in that sense I would agree with Kevin Warsh's comments. Here's how I think about robustness. If you have a model where everything is going to return to the balanced growth path no matter what you do, and it's just a matter of how big the deviations will be, that's going to give you one view of the world and one view of the type of risk you have to manage. But if you have a model that says most of the time you're on the balanced growth path, but sometimes all hell breaks loose and you go to a completely different state of the world, that gives you a very different picture of what you're trying to do. Because in that world, all you're trying to do is stay away from the edge of the cliff. You don't really care about the fluctuations around the balanced growth path. You just want to say, "Well, what types of policies are going to keep me from falling off the cliff?" We don't have that kind of stuff. We don't talk in those terms, except anecdotally, and it's not part of our models, and we don't work with models that have problems like that. There are models in the literature. Probably the best-known sequence of papers—there must be several hundred papers—analyzes Diamond-Dybvig-style bank runs. In those models, you're thinking about what gets rid of the bad equilibrium. What keeps me from falling off the cliff? That dominates the thinking in that literature. We don't have that for ordinary monetary policy. We treat the world as if it's quite a stable place—even though you could be subject to pretty big shocks, you would still eventually come back to the balanced growth path you started with.

So I think we could do a better job on that.

CHARLES EVANS: I'm not all that optimistic about the proposals on digital payments and currency, where all of the sudden it becomes easy to implement negative interest rates. I don't think those actions would be popular politically. I'm not sure how such a policy would be perceived. But the jury is still out on such proposals.

The kinds of things I worry about—and I've talked a lot about this—are the risks that would take us back to the zero lower bound, or the effective lower bound, if you want to describe it that way. I think these risks are really important because of the following asymmetry. On the one hand, if inflation picks up, we know how to deal with it. We know how to raise rates. It's not good, and we'd rather not be there. Volcker had to go through an awful lot to bring down inflation, and it was extremely costly. You wouldn't want to dissipate that credibility. But we do know how to raise rates. On the other hand, providing more accommodation when there are factors standing in the way (such as the ZLB) and the economy is suffering is a very big challenge. So that's why I think these issues are very important.

Now, just to provide a little balance, I have for the longest time not given a lot of airtime to this question: What if the low-inflation risk turns into the high-inflation risk? I haven't because, frankly, it has become hard to imagine this scenario. John, I've never understood all the ins and outs of the fiscal theory of the price level. There's a certain elegance to the inflationary implications of the consolidated intertemporal budget constraint that you have pointed out many times. But all the ins and outs of active fiscal policy playing out against passive monetary policy are a big part of the story. I always go back to Leeper's very important paper in 1991 to think about this, and I've got a colleague, Leonardo Melosi, who has distilled this into a very nice descriptive piece.[4] Start with a certain period of time—like maybe eight quarters—when fiscal policy becomes irresponsible. That kicks it all off. Deficits become so large that the real value of the debt has to go down. How's that going to work? Well, it's going to work through an increase in prices. And you can get some large inflation rates out of that. Now, active monetary policy would react to this inflation. Such a situation would be very challenging, because it would get monetary policy and fiscal policy actively working against each other. The resulting equilibrium is not well laid out. This would put you into the realm that Jim, I think, is talking about—sort of outside the normal approach.

JOHN COCHRANE: Well, a global sovereign debt crisis would be challenging. [*Laughter*]

JAMES BULLARD: I just had one other thought that I wanted to hit on here. The idea of having eighty (or eighty-four) models and that you should check what's going on with many different frameworks—this is what Volker Wieland and John Taylor were talking about—and see which things appear to be consistent across models and which things are not consistent. That might be a good way to get better robustness in decision making. I actually think that's quite a good idea, as opposed to what we do now, which is to run different scenarios within FRB/US. Now you're getting to a world with better IT, better computing. You

4. See Eric M. Leeper, "Equilibria under 'Active' and 'Passive' Monetary and Fiscal Policies," *Journal of Monetary Economics* 27, no. 1 (1991): 129–47; and Francesco Bianchi and Leonardo Melosi, "The Dire Effects of the Lack of Monetary and Fiscal Coordination," NBER Working Paper no. 23605, July 2017.

could probably do the eighty-four models with not exactly a push of a button, but you could probably automate a lot of that and look at different scenarios and different models.

JOHN COCHRANE: Quantity versus quality on models . . . I like it.

I'm just going to ask one last question, and then we'll open it up. There is an elephant in the room. I won't ask you to comment on the CHOICE Act or other specifics, but clearly this is a moment when our country is rethinking the Fed's general structure, the nature of congressional oversight, and your relations with the Treasury. I welcome any comments that you're willing to make on good or bad aspects of this. How should reporting be improved? Should it be more relative to rules or not? Do you favor the separation of monetary policy and supervision and regulation? Should the Fed welcome limitations on what it does, because limitations on actions are also limitations on responsibility? Should the Fed and Treasury come to a new agreement or accord, and stop this business where the Treasury sells long-term debt and then the Fed buys it all back up again? Really, who is in charge of the maturity structure of the debt anyway? Should the Fed and Treasury routinely swap securities so that the Fed doesn't end up holding maturity and credit risk for long periods of time, as Charlie Plosser suggested? Are there any structural and supervision issues of that sort you're willing to comment on?

ERIC ROSENGREN: You had a long list there, so I'll take a couple of them. We've talked a little bit about monetary rules. I want to emphasize that we do look at rules. We spend a lot of time looking at rules. And we don't just look at one or two rules—we look at a lot of rules. I think it is very important to think about rules, to think about why you're diverging, and to come up with coherent explanations for why you're coming up with a different answer than a particular rule.

That, however, is very different from legislating a rule that you have to follow, which gets audited by the GAO and results in congressional hearings. I'm not in favor of legislation that would provide a rule, or have us regularly provide a rule and then have to meet it, for many of the reasons that Stan highlighted. That aspect of the legislation I don't find particularly productive.

You mentioned supervision. I think it's impossible to divorce monetary policy from supervisory policy. One of the reasons the financial crisis and its aftereffects became so serious and damaging for so many people was because of the problems at financial institutions. In fact, it's not at all unusual around the world that in instances where recessions coincide with severe problems in the financial sector, they're much more severe, take much longer to recover from, and have broad implications for society in general.

So I do think it's important that we understand those tradeoffs. The topics came up a couple of the questions earlier. I don't think we can divorce supervisory responsibilities from monetary policy responsibilities. I think we have to think about those two things and how they interact. This is a very important aspect of what the Federal Reserve does, and I wouldn't want to see that change.

JAMES BULLARD: I'm going to mention some areas of Fed reform I've advocated in the past that I think we could do unilaterally without congressional action and that I think would help alleviate some of the pressure on the Fed.

One thing we could do is have a press conference at every meeting, make each meeting ex ante identical, allowing the committee to move at any juncture. Other central banks do this. We're one of the few that don't. I think this is important because the markets and the wider monetary policy community want to hear from the chair, because the chair and the chair only speaks for the committee. Whatever you decided a month ago or six weeks ago, there has been intervening data—this and that have happened—and they want reassurance that you're still on track, or if you're adjusting slightly, they want to know you're adjusting slightly. My vision is that communication should be more or less continuous because developments in the economy are a more or less continuous process. If you had a model based on continuous time and Brownian motion, the policy maker would react in continuous time. You want this idea of continuous communication in epsilon amounts: almost nothing is said on any particular day, but because you're communicating all the time, markets are never surprised by monetary policy. I think press conferences would take us a step in that direction. As it is now, between press conferences we're at the mercy of the speaking schedule. Sometimes that doesn't work out all that well, especially over the holiday period in the United States. So I think we could do more.

We could also have a monetary policy report at quarterly intervals, which would lay down a baseline for markets and for the policy makers on the committee itself. Here's what we're thinking at some very basic level on what's going to happen in the economy. You could compare what private-sector forecasters are saying. And then everyone on the committee could give their own views relative to that baseline. So I think a monetary policy report could go a long way to improve Fed communications. In addition, that report could include all kinds of reporting relative to monetary policy rules, because, let's face it, John Taylor revolutionized how we do macro and monetary economics. We already give long speeches in terms of monetary policy rules. Janet Yellen did it here at Stanford just recently, but this has been going on for years. We already talk in terms of monetary policy rules. We could put that into the report, in the appropriate way, and this would provide a benchmark for everybody: here's what this rule says, and here are some reasons why we're not doing exactly what is prescribed by that rule, or the committee's judgment was that it wasn't the right thing to do at this point. I think you could get this idea of rules reporting going if you had a monetary policy report.

None of these things require legislation. I think the Fed could take steps in this direction, and then we might not stress our lawmakers quite as much, because they have a lot of other things they need to be doing.

CHARLES EVANS: It's extremely important for us to be accountable to Congress and the American public and to explain what we're doing. I often think that as central bankers we use language that strikes me as a bit arrogant. For example, some say, "We need independent monetary policy." Independence in a democracy? What are you talking about? That's why accountability is so important. So the chair goes up to Congress and testifies twice a year and schedules talks to the congressional Joint Economic Committee (JEC). (Indeed, the taper tantrum started when Bernanke made some comments during a JEC meeting.) And system officials go up to the Hill at other times when called upon. I think that's appropriate.

Because of this accountability, it's natural for us to talk about communication. You could wonder, "Why do you always have to talk about communication? That must be a sign something's not right." But it's more a sign that it is appropriate for us to continually assess our transparency.

On the quarterly Summary of Economic Projections, let me just offer what may be a minority opinion on a subtopic, which is the dot chart. Now, the dot chart is something that you either like a lot or do not like—and you may also say you don't understand it. I think Kevin said he thought the dots were on top of each other. They might be on top of each other for forecasts made late in the current year, when there's no action we could do that's different from what we all know we will do. But at one year or two years ahead, the dots put our disagreements on full display—for example, when somebody has eight increases over the next year or two, and someone else has none. People ought to want to know why that is. I think answering that question is one reason why FOMC participants go out and explain their views. And I think those communications are very useful.

Charlie Plosser, I apologize if I didn't ask you about this ahead of time, but I hope you will be fine with what I am about to say. Charlie and I didn't always agree on the policy path for the next couple of years. But I'm pretty sure we might have submitted about the same inflation forecast two or three years ahead, along with a similar outlook for the unemployment rate, and that we both thought output growth would be at trend. What was different? It was the underlying assumptions about the economy and the policy needed to achieve our forecast. And the dots showed that difference in policy. In other words, some FOMC participants said, "I'm going to get there, but I'm going to get there with higher rates because I'm fighting inflationary pressures." While others would say, "I'm going to get there, but I need low rates to do so because we have to get inflation up." I think this distinction is very informative, and that's part of what we need to have the public understand.

GENERAL DISCUSSION

JOHN COCHRANE: I promised I'd reserve the first three questions for our ex-FOMC members, and then everyone else gets a chance. So do you guys have something you want to ask?

CHARLES PLOSSER: I have a few observations. First, I want to follow up briefly on Charlie's last point, since there's a degree to which I take some responsibility for the dot plot and having it there in the first place. I spent a lot of time in speeches trying to explain to people what it meant and what it didn't mean. I'd often use the example that Charlie just gave, which was that participants may have the same or similar economic projections but very different ways of getting there—that is, their underlying policy assumptions may be quite different. Partly what's incomplete about the presentation of the SEPs is that readers of the summary can't match up those individual forecasts with the corresponding dot. Many of us have argued for a long time that publishing the full matrix, which matches up the forecasts and policy assumptions, would be helpful in understanding some of these issues.

My second observation elaborates on Jim's comment about a monetary policy report and how we treat rules. At this conference three years ago, I gave a talk where I said that what the Fed could and should be doing to help promote and communicate a more systematic policy strategy is actually to make the rules and projected outcomes that the staff produce part of a public monetary policy report. This has several benefits. For example, while it doesn't require adopting a specific rule, it does offer an opportunity for the committee to compare its decision to the guidelines provided by a range of plausible and robust rules suggested in the academic literature. In doing so, it provides an opportunity to elaborate on the logic and thinking behind the decisions and explain why it chose to deviate or not from the guidelines. This would improve the committee's communication and be helpful in articulating or revealing a monetary policy strategy. I'm glad Jim's talking about that. I hope the committee is considering such an approach. Had it been adopted sooner, you could have headed off some of this stuff that the Congress is trying to impose and micromanage through legislation. And by the way, Mike Dotsey and I provided a sort of model report about how you might go on about doing that—and I think Philadelphia is still doing it.

The other observation I have concerns the treatment of tail risks. This has come up a lot during the recent recession and crisis. Central bankers are naturally a worrisome lot: they wring their hands, and they're always afraid about what can happen. I suspect that's appropriate to some degree. It's kind of the nature of the beast. But I worry about overstressing unusual events and thinking of them as regular events. For example, when I was first learning macroeconomics and thinking about building models for the macroeconomy, a very common reaction you'd get in academic circles was, "Well, that's great. That looks good. You got everything working fine. We understand it. But your model doesn't explain the Great Depression. And if your model doesn't explain the Great Depression, I'm not interested in it." Well, we still don't understand the Great Depression. It's what—eighty years later? And people are still writing papers and debating causes and the choice of policies. There are revisionist views about what happened, why it happened, what policies worked, what policies didn't work. Lee Ohanian's been writing about different ways of thinking about the effects of fiscal policy. So there's a lot we still don't understand. I think there's a lot we don't understand about this crisis too. And I suspect, sixty years from now, economists are still going to be speculating about what happened and why, and which of the panoply of policies were effective and which were not.

So I want to ask, Do we get too focused on tail events and risk avoiding policies that may be effective because we think some rare or low-probability event might occur? Such risk management approaches have costs as well as benefits. Moreover, we may not even know what the right policy would be in the rare event. The world of what-ifs is quite large, limited only by our imagination, and placing meaningful probabilities on such tail events is difficult at best. Yes, forecasting is hard but necessary, and it is difficult enough to consider deviations from modal outcomes and normal uncertainties, but are we, and the economy, well served by holding policy decisions hostage for fear of truly rare events? While risk management strategies sound appealing, they are exceedingly difficult to execute effectively. When undertaking them, how does one evaluate the trade-offs and the uncertainties of rare events occurring and the consequences of their occurrence? Do you design policies or mechanisms that solve the big problems and then not worry about the normal problems? Or vice versa? How do you approach assessing the trade-offs? I think this line of thought poses interesting and challenging issues about the design of policies and bears more work and thought.

ROBERT HELLER: I heard a lot of willingness to engage in future market operations here, QE-type operations. As I look around the world, the biggest risks I see out there are the black swans: the insurance companies and especially the pension funds. A lot of them are underfunded by enormous amounts, so how are you going to deal with that if you then want to do QE?

And in the same vein, if you have higher inflation—and some people have advocated that on this panel—a lot of these pension funds will take losses, because as public pension funds they are fully indexed. So higher inflation is no way out of the dilemma you're facing, and you've got a big black swan that you can actually see. What are you going to do about that?

ERIC ROSENGREN: Let me combine the two, actually, because you're talking about a specific tail risk. And I think understanding what could cause problems for leveraged financial institutions is critically important. Insurance companies, banks, and other types of financial intermediaries could be significantly impacted. Charlie made the argument that maybe we spend too much time on tail risk. I'd actually make the opposite argument, that it's really costly to have an unemployment rate at 10 percent. If the unemployment rate rises from 4.4 to 4.6 percent, that's not a significant problem, but if it is rising and the unemployment rate is already 10 percent that is a huge problem. We're still suffering a decade after the last event; a lot of this discussion is tied to what happened in that event. The problem with tail risk is that it has long tails, and it takes a long time to recover. So I think we should always ask ourselves, what kinds of problems could generate these very severe outcomes?

I agree with your point that you don't want to construct a design for the kind of monetary policy you want, just for bad outcomes. But recessions are not, in some respects, that big a tail risk. They happen periodically. It's not like we have one every fifty years; unfortunately, it has been one every ten years or so. So if you design a system such that every time you hit a recession you're going to have a problem, that's probably not an ideal system. You should be thinking about the tail risk and trying to avoid it. Monetary policy may not be the right tool to avoid it. In fact, in the case of insurance companies and pension funds, probably regulatory approaches are far more appropriate than monetary policy approaches.

CHARLES EVANS: Well, long-duration liability managers have obviously been challenged in the environment of low interest rates—life insurance companies, pensions, and the like. It's very easy to go to some event, sit down at dinner, and find that your hosts have steered you toward sitting next to someone like that—and then they kind of say, "What?" [*Laughter*] Interest rates are low, and they often think you are really hurting them. Similarly for savers, who've done everything right throughout their lives and now are suddenly facing low interest rates on their assets.

Monetary policy has tried to reduce longer-term interest rates through portfolio balance effects in order to induce more risk-taking and get us back to better growth. But it's not just monetary policy. For example, after the taper tantrum, term premiums went up a hundred basis points and then retraced that rise. The decline wasn't because we expanded our asset purchases; it was because worldwide interest rates were falling. There have been many factors at work, such as the ones George Shultz talked about in terms of AI and 3-D printing and their differential impacts on labor markets for different segments of the population. And trend output growth rates are lower, and these reduce r-star.

Monetary policy does live in this low-interest-rate space, and this means there likely are going to be more periods in which we have to deal with the zero lower bound. That's why I say the zero lower bound is the risk that worries me most—I'm not sure we can handle it as effectively as we would like.

DENNIS LOCKHART: I'll ask a fairly concrete question about, say, 2018 Fed policy, and that is the relationship between tapering the balance sheet and rate increases. What's your current thinking as to how much accommodation will be removed through various scenarios of tapering the balance sheet versus increments of twenty-five basis point increases in the policy rate?

CHARLES EVANS: I carefully consulted the minutes of our March meeting during the break just to make sure I understood what we had all said. It's pretty much what people have been saying in speeches. The committee is looking forward to the upward-sloping funds rate path being confidently in place. Today, the fundamentals for the economy are good, so we're moving toward this place. When well under way with the rate increases, then we'll start adjusting the size of our balance sheet by not reinvesting the maturing securities. The minutes indicate that many participants thought this could begin before the end of 2017. They also indicate that we discussed whether we would let the full amount mature and not be reinvested or, in some cases, only reinvest part of the maturing securities. I think if you look at the monthly patterns, some months have larger maturities, and that could get in the way of some of the Treasury funding. So adjusting reinvestments to smooth out those patterns is one possibility. But, you know, I'm not sure it's essential. Those are some of the issues we talked about.

JAMES BULLARD: We adopted this regime-switching view. We think we're in a very low real interest rate regime right now for a variety of reasons. We don't really see the factors that are affecting that regime switching very soon. So over the forecast horizon, we have a very low policy-rate path. Our dots are definitely not sitting on top of everybody else's dots. If we went up twenty-five basis points, or even fifty basis points, I don't think that would be the end of the world. But what I do object to is the idea that you have to go on this very long march up to two hundred basis points or more over the next two years to keep unemployment low and inflation near target. I don't think you have to do that given the current circumstances.

If that's the view you take—and it should be—then the logical approach is to allow the rest of the yield curve to adjust normally and naturally. So you'd want to take the pressure coming from the big balance sheet off the longer-term rates. You could allow for the runoff of the balance sheet. You could manage that, or you could let it all run off. The chair will have to make a decision about that.

ERIC ROSENGREN: The committee hasn't made decisions on this, so I can only speak for myself. But my preference would be that we start reducing the balance sheet relatively soon, and we do it in a very gradual, highly tapered way, so it can serve "in the background." If it's highly tapered and pretty gradual, you can continue to focus on the federal funds rate as the primary target for meeting your inflation and unemployment objectives. And so, those are the two principles that I would focus on: highly tapered so it's not disruptive, and it's not the primary tool that you're relying on. And I wouldn't wait all that long.

I have a slightly different view than Jim. We're at 4.4 percent unemployment. My estimate for full employment is 4.7 percent, so we're already low. A lot of the private-sector forecasts have GDP growth that's in excess of 2 percent. My own estimate of potential is 1.75. That would imply continued pressure on labor markets. So I am a little worried that we need to take away the accommodation. We've been doing it very gradually by historical standards, and I think that's appropriate. I want to continue doing it gradually, and the best way to do it gradually is to continue so we end up hitting our dual mandate in terms of both inflation and employment.

MARTIN EICHENBAUM: There's an important interaction between regulatory policy and many of the questions we've been discussing, such as the level of r-star or the size of the Fed's balance sheet.

Let me give two examples.

First, banks pay enormous attention to key regulations involving liquidity coverage and common equity ratios. Safe assets like excess reserves play a special role in the way these ratios are calculated. For example, excess reserves don't take a haircut when you calculate the numerator in the liquidity coverage ratio. In addition, that type of asset gets little or no weight when calculating the value of risk-weighted assets for the denominator of the common equity tier 1 ratio. So these assets have an important value beyond their direct pecuniary yields.

The growth of regulations involving liquidity coverage and common equity ratios has led to a dramatic rise in the demand for safe assets. You can see this effect directly in the composition of banks' portfolios. Banks have gone from holding around 4 percent of their assets in Treasury bills to something around 8 percent. The rise in banks' demand for safe assets is a very real, concrete phenomenon. This rise has arguably contributed a lot to the fall in interest rates related to r-star.

To the extent that the rise in regulations has contributed to the fall in r-star, there are interesting trade-offs to consider when balancing monetary and macro prudential policies. For example, do we want to increase r-star a bit by relaxing some of the bank regulatory ratios? Another example involves efforts to reduce the size of the Fed's balance sheet. Suppose the Fed sells some of its risky assets to the private sector. Those sales will inevitably remove excess reserves from the system. But remember that those reserves play a special role in the regulatory ratios. Banks will have to somehow adjust the size and composition of their assets to comply with regulations. Presumably that adjustment will involve an increase in safe assets that substitute for excess reserves. That type of adjustment will push yields on safe assets down, not up. That's very different from the conventional view of how a smaller Fed balance sheet will affect rates. While the regulatory effects may not dominate the net effect on yields, it will almost certainly have effects that we need to take into account as we move forward.

JAMES BULLARD: Part of the regime idea is exactly that the demand for safe assets has increased, not just in recent years but over the last three decades. The one-year ex post real rate on a US Treasury was in the 5 percent or more range in the mid-1980s. It's now −1 percent. So you're down six hundred basis points. It's a long-term trend, and it doesn't look like it's turning around anytime soon.

If you talk to people in financial markets, they say exactly what Marty Eichenbaum just said: "We're being required to hold these safe assets for various regulatory reasons. The demand in some sense has skyrocketed, not just in the United States but worldwide, so what do you expect? The prices are going to be very high and the yields are going to be very low." These are exactly the rates that are most relevant from a monetary policy perspective, and they provide a baseline for a Taylor-type policy rule. This is part of what we've taken on board in our regime view, in addition to lower productivity and lower labor force growth. That's why we think we're in this low-rate environment, at least over the forecast horizon. So I do think there is some interaction. I'm not sure I'd go so far as to say, "Well, you should back off of those kinds of requirements" on the grounds that you want to have a higher r-star for monetary policy. I think monetary policy should probably adapt to the regulatory policy environment, and that's what we're trying to do.

ERIC ROSENGREN: I completely agree with your fundamental point that when we think about monetary policy, we have to be thinking about how supervisory policy interacts with it. Liquidity requirements, though, are actually a critical component of how we think about what happened in the last crisis. The dependence on wholesale funding was one reason investment banks were subject to runs and why we had the kind of problems we saw in 2008. So I'm not sure the answer to safe assets is to allow the banks to once again get into a situation where they're potentially illiquid.

I strongly believe that we need to focus on making sure that financial institutions are able to weather liquidity shocks. And I wouldn't do it by pulling back on liquidity requirements. I do think that the Treasury has a way of providing more safe assets. Debt management, if it's worried about this, could involve issuing much more at the short end of the market to relieve some of these concerns. That seems much less costly, particularly for stress scenarios, than trying to change the liquidity requirements. But I think your more general point—that whenever you think of system design for monetary policy, you have to take into account how regulatory requirements interact with monetary policy supply design—is critically important.

JOHN COCHRANE: What Marty brings up is that there are two sides of this balance sheet: there are the assets and the liabilities. We got ourselves into talking about the assets—how you're buying very long-term debt as the effective long end of the yield curve—and Marty brings us back to liabilities. Wait a minute! These vast quantities of reserves are actually important now, not just because of reserve requirements but because of other things. Perhaps the other way out of the conundrum is that the Fed gets rid of the longer-term assets and the MBSs but keeps a large balance sheet funded by short-term Treasuries, and that way you can keep the big reserves as well.

CHARLES EVANS: I'm trying to figure this out. . . . [*Laughter*] We'd be taking those Treasuries off the market, and they are safe assets. But you're right that we'd also be supplying safe reserves. That was my back-and-forth thinking on the subject.

JAMES BULLARD: I don't think reserves are a perfect substitute for short-term Treasuries, so I think the Treasuries are more valuable in the marketplace.

JOHN COCHRANE: Treasuries are more valuable than reserves. Yes. That's an interesting observation. We're used to thinking of money as suffering rate of return dominance because it's more liquid than debt, but now it's the other way around.