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Transcript of Session 4: Policy Tools to Support the Policy Framework
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ANNETTE VISSING-JORGENSEN. Welcome back, everyone, to the last session of the day, which is going to focus on the tools that the Committee has available to implement its policy framework. My name is Annette Vissing-Jorgensen, and I'm a senior adviser in the Monetary Affairs Division here at the Board. Along with Trevor Reeve and David Lopez-Salido, I've been in charge of picking the speakers and the discussants. So let me know if there are any that you particularly enjoyed.

We have a star-studded lineup for today's panel. Our paper presenter will be Silvana Tenreyro who's an economics professor at the London School of Economics. Silvana served as external member of the MPC at the Bank of England from 2017 to 2023 and is a renowned expert on both monetary policy as well as international trade. Her list of academic honors is too long to cover within the allocated time, but we look forward to the paper.

Our discussant will be Sam Hanson. Sam is a finance professor at Harvard Business School. He's an expert in macrofinance and has worked on many topics at the intersection of monetary policy, macro, and finance. In addition to being a finance professor at HBS, he's worked for an, should I say, esoteric list of institutions, including the Lehman Brothers, the New York Fed, and the U.S. Treasury where he served as a special assistant and liaison to the White House National Economic Council. With that, let me turn it to Silvana.

SILVANA TENREYRO. Thank you very much, Annette. So thank you very much for having me in this conference named after Thomas Laubach. Thomas was a phenomenal

economist and a role model for many of us who started our careers as economists at the Federal Reserve System. So I will talk about unconventional policy tools at the Fed. That was my homework: lessons from theory and practice. And this is based on joint work with Mo Wazzi, who's here from Oxford University.

Let me start with a very brief motivation. Unconventional policy tools have played a central role since the Global Financial Crisis, and they were extensively used during the COVID pandemic. As part of the Fed's policy strategy review, it's important to evaluate their design, transmission, and effectiveness. So we focus in our paper on the two most important unconventional monetary policy tools used by the Fed: forward guidance and large-scale asset purchases.

In my presentation today, I will first briefly discuss the theory and evidence behind these tools. There's a more thorough discussion in the paper for those interested. Next, I will zoom in on the 2020–2024 experience, drawing some takeaways and reflections from the actions taken by the Fed during this period. And, finally, I will highlight what we think are the main lessons and some of the open questions that require more research.

Just to be clear from the outset, our focus is not on the appropriateness of the monetary policy stance taken by the Fed during this period. That's part of a separate discussion. Our focus is on the tools themselves. Are they effective? Should they be kept in the toolbox? How can we improve their design?

So starting with forward guidance, understood as central bank communication regarding the future path of policy or the economy, it's actually not new or unconventional. The Fed had started using some form of forward guidance back in 1999, although its use intensified after the Global Financial Crisis.

The literature has distinguished between two conceptual forms, Delphic and Odyssean. Delphic guidance entails a forecast of the likely future path of policy without any commitment. And this consists mostly of communications, of the Fed's reaction function. By nature, this Delphic guidance is state contingent and time consistent. The second form is Odyssean, which consists of stronger guidance with at least partial commitment to a policy path, and that commitment is often time inconsistent; it goes beyond the boundaries of the mandate.

Now, what we define as Delphic or Odyssean depends on the framework's mandate. So, for example, with the Fed's flexible average inflation targeting framework, guidance to achieve an overshoot in inflation in the future to make up for past shortfalls would be considered Delphic, the makeup strategies embedded in the framework. In contrast, before the pre-2020 framework, any guidance regarding a future overshoot in inflation would be thought of as Odyssean, entailing a commitment that goes beyond the mandate.

Now, unlike the policy rate, which is a simple scalar, forward guidance is a multidimensional tool and can take many specific forms from open ended and perhaps conveying little information but entailing high flexibility for the policymaker to the other extreme of calendar-based guidance—which offers greater certainty about the policy path but limits the flexibility of the policymaker—and everything in between, including state-contingent guidance or guidance that embeds some knockout clause in it.

Now, over the years, the Fed has used different forms of guidance. And, in the paper, we discuss different examples, along with the pros and cons of the various forms. Now, theory tells us that both forms of forward guidance, Odyssean and Delphic, reduce uncertainty, lowering the risk premium and the term premium. And, additionally, with stronger commitments, forward guidance can also lead to lower expectations of the policy rate in the medium and longer term.

Even without those commitments, some form of Delphic guidance can also lower interest rate expectations if, for example, the market pricing is sufficiently misaligned with the Fed's reaction function. By lowering rates, forward guidance should lead to higher expectations of inflation and growth and, hence, increased spending by households and firms. That's the theory. And the evidence suggests that forward guidance indeed reduced interest rate uncertainty and had significant effects on yields, equities, and broader asset prices.

And while it's reassuring that this first stage of the transmission mechanism has worked, direct evidence on the macroeconomic impact on output or inflation is less conclusive. And the effects of forward guidance tend to be imprecisely estimated. There is a very nice paper by Thomas Laubach, recently updated by his coauthors, making precisely this point. And there's other work; Swanson has a paper making the point that forward guidance has been important in pushing output. But there's some disagreement in the empirical literature.

Let me now turn to asset purchases. Sometimes I will use QE for short. We examine large-scale asset purchases financed by central bank reserves. These purchases are asset swaps. They change the asset composition of the buyer's and seller's balance sheet. And, as such, they are not direct transfers of wealth. And this is in contrast with some popular mischaracterizations of QE as helicopter drops or bank bailouts and so on. Again, unlike the policy rate, asset purchases are multidimensional tools, and they can have very different asset structures, purpose, and design.

In terms of assets, the Fed has purchased mostly U.S. Treasuries and mortgage-backed securities. And during the COVID pandemic, it also bought corporate bonds. And, within those bonds, there are differences in maturity and risk. In terms of purpose, the purchases can be done for monetary policy purposes to stimulate the economy or for financial stability purposes,

providing liquidity in times of market stress. And, in terms of design, they can consist of fixed-quantity announcements versus open-ended flows. They can be specified in terms of prices or quantities and so on.

Now, the three main transmission channels identified by the theory are portfolio rebalancing, signaling, and liquidity. These channels can affect Treasury yields, exchange rates, bank funding costs, and wider asset prices. And through that, they can lower borrowing costs and also push up collateral or produce wealth effects that eventually lead to more spending and income. And, finally, the last step is pushing up on inflation and activity.

So, in our paper, we describe these transmission channels at length, along with the theory and evidence behind them. Broadly speaking, there is evidence in favor of all three channels. And there's also new evidence for what we can call the "backstop" channel, the idea that the announcement of asset purchases by the Fed can act as a put reassuring markets that the Fed will act again in times of market disruption. They may also work through a bank lending channel, which was important in Europe but less so in the U.S. One point to observe is that often these channels are studied separately, and there's no unified framework to decompose their different contributions or make them adapt to an overall impact. And we'll discuss this point again at the end.

Turning to the macroeconomic effects of asset purchases, the evidence indicates that large-scale asset purchases were effective as aggregate demand tools pushing up on activity and inflation. And, again, here there's a very nice contribution by Thomas, finding significant effects on activity and prices. One observation, though, made by Fabo and coauthors is that there is wide dispersion in macro estimates across times, across countries, and across different methods.

And this variation can be explained by differences in identification strategies, modeling assumptions, and transmission channels emphasized.

And to appreciate or to illustrate this dispersion, this, I think, is a very instructive graph taken from Gulati and Smith's meta-analysis. The graph summarizes a range of estimated effects from asset purchases mapped into 10-year yield space. So, taken at face value, it says that the cumulative impact of asset purchases on 10-year yields is somewhere between $\frac{1}{4}$ and 2—I'm sorry—and 4 percentage points. And this is a very big range, of course.

But notwithstanding the range, I think the evidence is firm in the fact that these asset purchases had an impact on activity and prices. And based on that evidence, our recommendation is to keep these large-scale asset purchases in the monetary policy toolkit. They might be needed in case the economy hits the ELB again, the effective lower bound, or if there is market disruption, which would require to intervene with the financial stability goal.

In the case of forward guidance, we think Delphic guidance should be standard practice in central banks' communication and Odyssean should be left for very extreme circumstances. Of course, how effective these tools are depends on how they're calibrated and deployed. And, in the rest of my presentation, I will focus on this point and see what we can learn from the recent experience for future use of these monetary policy tools.

So let me turn to that post-2020 experience. So, regarding forward guidance, during this period, the Fed used at least four different types of guidance: first, the dot plots, which was a continuation of a practice started back in 2012; second, and to a large extent underpinning those dot plots, the Fed had guidance on interest rates; and, third and related, guidance on the asset purchases. Finally, there was also guidance on the sequencing of an eventual liftoff or tightening of monetary policy.

Let me go through this, through the interest rate guidance and asset purchase guidance, first. The rate guidance, introduced in September 2020 and maintained until November 2021, indicated the intention of the FOMC to keep the target range of the federal funds at 0 to $\frac{1}{4}$ percent until the labor market conditions had reached levels consistent with the Committee's assessment of maximum employment and inflation had risen to 2 percent and it was on track to moderately exceed 2 percent for some time. The asset purchase guidance introduced in September 2020 and maintained until June 2021 was to continue to increase holdings of Treasury securities by at least \$80 billion per month and of mortgage-backed securities by at least \$40 billion per month until substantial further progress had been made towards the Committee's maximum-employment and price-stability goals.

So it's clear that the guidance for rate liftoff was much more demanding or the conditionality was more demanding than for stopping asset purchases. It required three conditions: maximum employment, realized inflation at 2 percent, and expectations that inflation would overshoot moderately the 2 percent target for some time. For asset purchases, it simply required evidence of progress towards maximum employment and price stability.

And, finally, the ancillary guidance on sequencing of tightening introduced the timing component in the form of two conditions. First, the interest rate liftoff would start after the asset purchase program was concluded. And, second, the FOMC intended to provide ample warning or lead time before starting the tapering of asset purchases. So we can see here that the rate and asset purchase guidance were state contingent, but the sequencing guidance had a more rigid component linked to time. So, potentially, there could have been tension between the sequencing guidance and the rate guidance if, for example, the three conditions for rate liftoff

were reached right after the conditions for asset tapering. This would have forced the Fed to give up on the ample warning or to delay liftoff. So that was forward guidance.

Turning to large-scale asset purchases, the decisions can be split into two phases given the motivation. The first phase was about smooth market functioning, and the second added monetary policy stimulus to the motivation. Specifically, in March and April 2020, the FOMC announced asset purchases aimed at supporting smooth market functioning, including, on the 15th of March, purchases of at least \$500 billion on Treasuries and \$200 billion on mortgage-backed securities. On the 23rd of March, the program was expanded to unlimited purchases of Treasuries and mortgage-backed securities. And, plus, for the first time, the Fed started buying investment-grade corporate bonds. On the 9th of April, the corporate bond program was expanded to include also some high-yield debt as well.

So going to the second phase, in September 2020, the Fed expanded the justification for purchases of U.S. Treasuries and mortgage-backed securities to include not only a market-functioning goal but also fostering accommodative financial conditions. So there were, from September onwards, two goals behind the asset purchases. And, in December 2020, the Committee added the forward guidance I discussed before, which focused on the monetary policy goals of price stability and maximum employment.

So, what are our main reflections from this experience? So when it comes to forward guidance, it's clear that there is a tradeoff between commitment to a policy course of action aimed at achieving high initial effectiveness versus having the flexibility to come out of the policy path or the QE program. And our reading is that the Fed's choices were tilted towards that commitment and having high effectiveness, putting perhaps less weight on the flexibility to exit.

In particular, if we look at the forward guidance criterion for rate liftoff, they set a very high bar to increase interest rates. And one could argue that they were insufficiently robust to unexpected shocks that could create a tradeoff between the objectives of maximum employment and price stability. This is why with hindsight—and I should emphasize the word “hindsight”—we think stress-testing forward guidance under different scenarios could be highly beneficial and become routine practice in central banks. I will come back to this later.

And just to illustrate what’s the point I’m making, we can compare the conditions embedded in the 2020 guidance with those in the 2012 guidance. And for this, I’m using this graph that I reproduced from English and Sack. The horizontal axis here shows inflation, and the vertical axis shows unemployment. The shaded area in each plot indicates the no-liftoff zone; that is, the policy rate is expected to remain without change in the shaded area.

So on the left-hand side, we can see the representation of the 2012 guidance. It contemplated the possibility of a tradeoff between inflation at target and maximum employment. Rates would be increased—the liftoff area here in white—if either unemployment fell below 6.5 percent or projections of inflation one to two years ahead increased above 2½ percent. So the wording here was structured to achieve a balanced tradeoff between inflation and employment. And the conditioning was based on projections of inflation rather than actual outcomes.

On the right-hand side, we can see the 2020 guidance. The conditions for liftoff, the white area, required both inflation above target and unemployment below the natural rate. So the wording did not contemplate the possibility of a tradeoff between these objectives. The second point I’d like to stress here is that the ancillary guidance on sequencing could have clashed with the main guidance on rates and purchases. As I said before, if the time between the fulfillment of

the conditions for QE purchases and the conditions for rate liftoff was too short, then giving ample warning for tapering would have delayed liftoff.

The third point I want to make here is that the guidance was outcome based, conditioning on actual realizations of inflation rather than projections. And, in general, this outcome-based guidance limits the ability to act preemptively in response to a change in outlook or even changing risks. And, finally, the last observation here is the escape clause. There was an escape clause there, but it was not sufficiently integrated in the main guidance and it was seen as a separate boilerplate statement.

Now let me turn to asset purchases. Here I'll make two observations. First, purchases were successful at restoring market functioning—and there's a very nice paper by Annette showing this—and the various rounds provided impactful monetary policy stimulus. And this is what the evidence I summarized or mentioned before was telling us.

The second point is that there was unclear differentiation or insufficient differentiation between the goals behind the purchases, whether it was done for monetary policy stimulus or for liquidity provision in a disrupted market. And, related, although the share of long-dated Treasuries purchased did increase after September 2020, the structure of the purchase between Treasuries and mortgage-backed securities didn't change after that. We think a clearer separation in design and message could enhance the effectiveness and increase the agility of policymakers to change course if needed.

So what are the lessons we draw? Again, I think the evidence indicates that these unconventional tools have been effective as aggregate demand tools. They move yields and asset prices, and they can effectively provide monetary policy stimulus. And, in light of that, we

take it as a given that both tools should be part of the toolkit. There's no reason to lose an instrument.

With that as a premise, the overall lesson we draw is that when designing and deploying these unconventional policies, it's important to consider the balance between policy effectiveness at the time of deployment and the flexibility needed to respond to future shocks. And we think that stress-testing policies before deployment using scenario analysis should be very helpful in the design and implementation of both forward guidance and asset purchases. And this projection into different scenarios should make policies more robust to changing outlooks or changing risks. And, in this way, the policymaker will have more information to decide when and how to use these policies.

Let me now move to more specific lessons for each of the tools. So this stress-testing we think is important for both. When it comes to forward guidance to this, I would add a couple of points: So, first lesson, stress-testing. Second, state-contingent guidance provides a better balance between flexibility and effectiveness. And policymakers should pay attention to the conditionality and perhaps be willing to give up some effectiveness initially to gain flexibility for later. The third point is that the contingent nature of the policy must be very clear, with perhaps a simple integrated escape clause that is part of the main statement.

Fourth, forward guidance should avoid being too outcome based. And given the lags in the transmission of monetary policy, guidance should try to allow for more preemptive adjustments in the monetary policy stance. And, finally, it should be clear that guidance could be revised in extraordinary circumstances. We think all these principles should be there at the deployment stage. And, of course, all these considerations must be weighed against the need for the language to be accessible and clear.

Turning to asset purchases, the specific lessons—so again, to start, lesson one would be to stress-test the purchase considering different scenarios. Lesson two is to have a clear distinction between the goals. By not differentiating them, the unwind of purchases made for liquidity purposes becomes too tied to monetary policy and perhaps sends the wrong signal.

With differentiation, tapering, ending, or unwinding liquidity purchases would be interpreted as a positive signal about market conditions rather than linked to monetary policy, and this will allow for less policy inertia. If purchases are kept as a single integrated tool, we think the structure of the purchase program should align with those evolving goals, and perhaps we didn't see this as clearly in this episode. Finally, while sequencing liftoff after ending asset purchases might be desirable for many reasons, we think it shouldn't be a hard constraint and the Fed should be willing to ignore it if needed.

So let me turn to the three open questions or, rather, the pending agenda for researchers. I'd like to emphasize three areas. The first one is that the range of estimated impacts of forward guidance and asset purchases remains wide and perhaps too wide for comfort. We're not in a position to answer some very critical questions, like how much have asset purchases lowered the curve and how much past purchases are still currently lowering it. How persistent are these estimated effects?

In finance, we tend to interpret the impact of these announcements on asset prices as permanent, and this makes sense if we think about markets as efficient. But the Fed is intervening here when markets are not operating efficiently, so this standard market efficiency assumption cannot be taken for granted. So having a more precise answer, for example, today, would allow us to answer a very pressing question: What's the impact of quantitative tightening on the yield curve today? How much of the recent increase in yields is due to QT and so on.

The second point is that while there are many great empirical and theoretical studies of the different forward guidance or asset purchase interventions, we don't have a sound unified framework to assess macroeconomic benefits and costs. And there is a nice paper by d'Avernas and coauthors going in this direction. We need more of this. Having an integrated framework is helpful for accountability and transparency. And it will allow policymakers to more clearly answer in Congress or to the public questions such as why were the actions taken, were they worth it, and so on. I mean, this is important because often the discussion outside of central banks tends to be narrowly focused on the fiscal cost of asset purchases and, more specifically, on the central bank's balance sheet losses, missing the broader macroeconomic benefits. So having the framework will be informative and clarify the rationale behind these policies.

And here I'd also like to stress that when asset purchases are done for monetary policy purposes and the economy is at the effective lower bound, it's very natural to have losses in the balance sheet. That's a sign that the policy was successful and able to get the economy out of the effective lower bound. And so this should not be read as failure, but as success. When the operation is done for financial policy, financial stability purposes, maybe there is some more scope for gains, but, in general, this should loom very small compared to the broader macroeconomic benefits of these programs.

Finally, I think other tools should not be ruled out—and Kenny's here about negative rates. The evidence from European countries and the ECB suggests that negative rates can provide monetary policy stimulus in recessions, opening additional monetary policy space. And this is particularly helpful when long yields, for example, are already very low and doing more asset purchases doesn't provide further stimulus.

So, to conclude, our recommendations are, first, keep these instruments in the toolkit. They are effective aggregate demand instruments at the effective lower bound. Away from the lower bound, they might be helpful to provide financial stability, definitely for asset purchases. And above the lower bound as well, Delphic guidance should be helpful in communicating the Fed's reaction function. Second, at the design and implementation stage, stress-testing the instruments to have a policy that is more robust should be beneficial and will allow the policymaker to balance the different tradeoffs.

Third, clarify objectives, which is important and might give the Fed more flexibility to exit some of the purchases done for financial stability purposes. Fourth, encourage more research. We need further work on narrowing these estimates of the unconventional policies' effects on inflation and activity and more work on creating this integrated framework to assess benefits and costs. And, finally, remain open to other tools, including negative rates, that could provide this extra space if we were to reach or hit the lower bound again. And I hope these reflections are seen in the spirit of helping to strengthen the toolkit for the challenges ahead. Thank you. [Applause]

SAMUEL HANSON. All right. Thank you very much for having me to discuss this paper. Just to kind of get started, obviously we think that much of monetary policy's impact on household consumption and investment, and hence the broader economy, arises from its impact on broader financial conditions. In particular, kind of the most important or baseline set of financial conditions are just the level of long-term interest rates. I'm a finance professor, so I obviously think of those as reflecting the expected path of short-term interest rates and then plus a term premium. And this term premium essentially reflects forces that shift the supply and demand for long-term bonds relative to short-term bonds. You can think of this as sort of

including the return compensation that investors require for bearing the interest rate risk of holding long-term bonds.

All right. So conventional policy is obviously we're moving around the current short-term policy rate. What are the unconventional policy tools that the Fed has? The first one is obviously forward guidance. We're communicating about the future path of short-term policy, hoping that is influencing expectations of future short-term interest rates and perhaps reducing uncertainty term premium as well.

Second, large-scale asset purchases. We're buying assets using interest-bearing reserves. The hope here is we're primarily influencing this term premium or other risk premium, but it might also end up influencing expectations of future short rates. And here the goal is to provide stimulus to the economy by easing financial conditions.

And then, finally, the kind of other unconventional monetary policy tool would be sort of liquidity facilities. So these would be making short-term collateralized loans but not kind of traditional discount window lending. And oftentimes facilities like this are essentially designed using Bagehot's dictum where we're trying to lend freely against good collateral at a penalty rate. And oftentimes here the goal is essentially to support orderly functioning of key markets.

All right. So I'm going to make three points essentially just underscoring and building on what Silvana said. So the first is about forward guidance. Here, essentially, I would basically kind of echo and completely agree that we can probably do a better job of striking an optimal balance between commitment and flexibility. And then, in some sense, we may kind of have opted for a bit too much commitment. So, as Silvana said, the very sensible way to think about this to determine kind of the optimal balance we want to stress-test potential formulations of

forward guidance in the face of large shocks, particularly supply shocks, that could create tradeoffs between the goals of price stability and full employment.

All right. So to echo kind of three concrete suggestions from Silvana's paper, the first is—yeah, the simple way to say it is “or” as opposed to “and.” So this is something that Bill English and Brian Sack emphasized in a recent paper. There's quite a significant difference between the 2012 style forward guidance, which said, “We'll lift off from the effective lower bound if either the unemployment rate is below some target level or if inflation starts to rise above a target” and 2020 style forward guidance, which said, “We'll only lift off if both of those occur.” Okay? And so this 2020 guidance kind of lacked this clear escape clause that could be quite important if there was an unexpected supply shock.

The second seems quite useful: Condition forward guidance on near-term forecasts as opposed to realized data. So this couching guidance, in terms of near-term expectations, is going to be a much more robust solution in a world where we think that there are lags between policy implementation and its full impact on the economy and, second, where there also may be external shocks that hit the economy that take some amount of time to fully impact the economy and show up in the hard data.

Third is this suggestion of essentially trying to delink guidance on the short-term policy rate from guidance on large-scale asset purchases. In the last two cycles, the Fed has essentially kind of signaled a reluctance to lift off from the effective lower bound until purchases have been completely tapered—so they stopped buying assets on net—and also, at the same time, a desire to gradually taper asset purchases in order to avoid market disruptions. So the combination of these means that if we have an open-ended large-scale asset purchase program that has a high monthly purchase volume, that essentially becomes a commitment to keep short rates low for the

length of time over which you'd—in order for you to slowly taper. Not clear, not 100 percent clear to me why these two need to be linked, why rates can't lift off until purchases cease. Also not completely clear why purchases need to taper so gradually.

As I'll kind of talk about in a moment, one of the key channels that we think of quantitative easing operating through is essentially a stock-like effect. It's the amount of duration that we're moving from the market. That's really the kind of reason it's not clear why we need to taper the flow so gradually. Obviously, we want to learn from past market events, but maybe some worry that the kind of very strong preference for tapering so gradually may reflect some amount of overlearning from the 2013 taper tantrum.

A way of saying this is that we may be somewhat stuck in what my good friends Jeremy Stein and Adi Sunderam would call a “gradualism trap.” So this would be a situation where the central bank has a bit of private information, say, about its reaction function. The central bank doesn't like bond market volatility, and, as a result, it tries to gradually adjust its policies in response to its private information. Of course, the market understands the central bank has gradualist tendencies, and, as a result, even if the central bank is making small policy changes, the market is significantly revising its forecasts. So gradualism essentially does not end up reducing volatility, and the central bank would just be better off if it abandoned gradualism.

What are some potential solutions? The first is, essentially, just clearly communicate to markets that we might need to quickly taper purchases in response to major surprises and shocks. The second would be to kind of promote a policy culture that is just slightly less concerned with high-frequency market reactions to announcements as opposed to kind of long-run impact.

All right. So second thing I want to talk about is large-scale asset purchases. Obviously, the Fed has primarily purchased long-term Treasuries and mortgage-backed securities since

2008. Typically, the goal has been to stimulate the economy by easing financial conditions. We're trying to reduce long-term borrowing rates essentially by reducing risk premia, particularly the term premium component of long-term yields. But as Silvana mentioned, some purchases have also been motivated by a desire to support orderly functioning of the Treasury market. By "orderly functioning" here, I essentially mean liquidity in the Treasury market, different Treasury securities that are similar trading at similar prices.

Obviously, during the COVID-19 period, the Fed began QE4. Essentially, it was an open-ended program. Eventually purchased over \$3 trillion of U.S. Treasuries and \$1.3 trillion of MBS. Started out based on this rationale of supporting smooth market functioning during March of 2020 when the Fed was buying Treasuries at a very, very rapid clip but then, in September of 2020, changed into one of trying to provide more accommodative conditions to financial markets—kind of the traditional rationale for large-scale asset purchases.

All right. So, what I want to talk about is sort of, what do we know and what do we not know about large-scale asset purchases? Silvana's paper I think did a great job of laying out what we do know. But probably more importantly, she summarized really well what we don't know about large-scale asset purchases. And this is kind of the metaphor that I often use when teaching students about monetary transmission. And I think of kind of monetary transmission as being like a doctor who's treating a patient that has an illness, but the illness is continuously evolving in real time.

Even if we could figure out precisely how different types of treatments work, how different tools are transmitted into the economy, the sickness would morph in unexpected ways. So the nature of monetary transmission is ever evolving. That's really fun as a researcher, but

it's much more difficult when you're a policymaker. So you know that we need to ultimately approach unconventional policy with the same humility as conventional policy.

All right. So, what do we know? The first thing I think we know is that large-scale asset purchases do, in fact, reduce long-term yields. We know that they seem to work through several different financial market channels. So, first, there's evidence for the portfolio-balance channel. This is where the Federal Reserve is essentially buying up assets, trying to remove interest rate risk for the market. And kind of the sufficient statistics here should be the dollar amount of interest rate risk that is being removed from the market.

There's also this backstop channel, which is essentially kind of a state-contingent version of the portfolio channel, and the signaling channel where the Fed's asset purchases convey information about the future policy rate. We know that the impact of large-scale asset purchases has varied over time. Particularly, the impact has been greatest, obviously, during periods of market volatility when we would think that investor risk aversion is high. This is consistent with the logic of the portfolio-balance channel.

That said, we don't know the exact mix of these financial market channels, and we also do not know whether this mix varies over time. A sense is, we also don't know whether the ultimate transmission of large-scale asset purchases to the real economy depends on this mix of financial channels. So an example would be, we think that lower mortgage rates stimulate mortgage refinancing, home sales, homebuilding. The question is, does it matter the mix of channels via which we lower mortgage rates?

My prior based on the household finance literature, and maybe what Yuriy was telling us about the people in the Michigan survey, is that the mix probably shouldn't matter. Households only care about the level of mortgage rates, not why rates have come down, if you told someone

in the Michigan survey that it was because of term premium. Yeah. And, as a result, the path of mortgage rates essentially should be something like a sufficient statistic for the total amount of accommodation delivered.

We know, in the short run, large-scale asset purchases definitely impact asset prices in the targeted asset class. We can see these short-run announcement effects; they're easy to measure, and they're meaningful. A thing that we don't know or know much less is how the effects spill over from targeted asset classes to other asset classes. So a classic question would be, do purchases of long-term Treasuries, does that end up impacting risk premia in the stock market? Okay? We definitely see short-run announcement effects in the stock market, but it's hard to know whether that reflects changes in the fundamentals of the economy because large-scale asset purchases are stimulating the economy or because it's reflecting changing financial conditions because LSAPs are moving risk premia.

A useful prior here from theory—but is, again, something we don't know—if we think that large-scale asset purchases are working through a portfolio-balance channel, they should really only impact risk premia to the extent that markets are somewhat segmented. The equity market is somewhat segmented from the bond market. What that means is that the marginal investor in, say, the bond market is a specialized bond investor who's bearing a lot of interest rate risk. They're bearing less interest rate risk following a large-scale asset purchase program, so that depresses the term premia. But that segmentation that the effects rely on is inherently going to limit the potential for spillovers from targeted asset classes to untargeted asset classes.

Another important thing that I think we know less about is how persistent the effects of large-scale asset purchases are on asset prices. Essentially, we have only run this policy

experiment a handful of times. We know that the short-run effects are there, but it's just hard to precisely estimate the long-run effects due to the inherent volatility of financial markets.

Again, a prior from theory—oftentimes we think that while asset classes, say, the stock market and the bond market, might be segmented in the short run, they'll be less segmented in the long run because investors will gradually substitute between different markets. Essentially, things are always more elastic in the long run than they are in the short run. What that would mean is, in the targeted asset class, say, in Treasuries, we'd expect the long-term effects on term premia to be less than the short-term effects. But we'd expect the spillover to nontargeted asset classes, say, equities, to exceed the short-term effects.

Final thing that we know less about is how this ultimately impacts consumption and investment. What we'd like to obviously measure is the kind of full transmission chain: Large-scale purchases ease financial conditions; that shows up in financing quantities, which has real effects. Obviously, to the extent that asset purchases have transient effects on long-term rates and financial conditions, they're going to have far less of a stimulative effect.

My sense is, given the uncertainty we have about the persistence of their effects on financial conditions, navigating solely essentially by adding up past announcement effects might be unwise and instead that, essentially, a better way to monitor this in real time is to seek evidence or look for evidence that asset purchases are leading to an easing of conditions that we actually see showing up in financing quantities. We want to see mortgage refinancing, home sales going up, the volume of corporate capital rising. And, in fact, there has been evidence from different episodes that in fact we do see this transmission to financing quantities. But my sense is we kind of haven't focused enough on the second arrow, the transmission from financial conditions into financing quantities. Okay.

Final point is this distinction between what's the rationale for large-scale asset purchases. Is it about improving financial conditions or supporting market function? In 2020, the Fed had two very distinct goals for large-scale asset purchases. The first was sort of the standard goal: Reduce the level of long-term yields to ease financial conditions. I would call this sort of an "absolute" value goal. The goal is to reduce the absolute level of all long-term yields or to prevent kind of an incipient and unwanted spike in yields. This necessarily involves the Fed bearing more interest rate risk so that investors can bear less risk. When do we deploy this? Presumably, it makes most sense when the policy rate is at the effective lower bound. If not, we just provide accommodation by reducing the funds rate at the lower bound—trade off the benefits of further accommodation from asset purchases against the associated fiscal risk.

The second goal is to promote orderly functioning in bond markets. Is it easy and cheap to sell Treasuries? Here, you can think of this as sort of having a relative value motivation. We're trying to promote orderly trading by reducing yield differences between essentially very similar instruments, say, Treasuries and swaps or on-the-run Treasuries versus off-the-run Treasuries. Typically, we think of this market dysfunction as arising due to a tightening of the balance sheet or risk constraints of broker-dealers. And, as I'll try to emphasize, addressing market functioning doesn't—and if it truly is market functioning, probably should not—require the Fed to bear more interest rate risk.

When to deploy? Presumably, we always want a well-functioning Treasury market. So, if the cost of alleviating it is tiny, we should arguably deploy it whenever there's significant dysfunction in the Treasury market. Just to kind of draw an analogy, you can think of this as being there's two very different reasons why a central bank might intervene in currency markets. The first is, it actually wants to do a foreign exchange intervention with the absolute value goal

of actually changing the valuation of its currency, say, to impact trade balances. This is where the central bank is essentially outright purchasing short-term bonds denominated in foreign currency. The central bank is obviously bearing currency risk.

Second very different motivation, or in a very different instrument, would be a central bank liquidity swap. So, again, this is sort of a relative value motivation. We're trying to promote market functioning in funding markets essentially by reducing deviations from covered interest rate parity. And the mechanics here are essentially just making a short-term collateralized loan, which does not involve the central bank bearing any risk. Okay.

So I think outright purchases are clearly the right instrument to target the absolute level of yields. The question is, are outright purchases the right instrument to address Treasury market dysfunction? As I said, we typically think the dysfunction is due to a tightening of balance sheet and risk constraints at dealers—this resulting in a decline in Treasury liquidity and market dislocations.

That said, large-scale asset purchases are not principally about taking pressure off of broker-dealers. Modern broker-dealers are essentially functioning as distribution pipes. And the Wall Street adage would be “They’re in the moving business, not the storage business.” So they’re not kind of the front-line arbitrageurs. And, in fact, we have very clear evidence that broker-dealers essentially bear minimal interest rate risk. Okay?

So what are the right instruments to target Treasury market dysfunction? I’d argue, essentially, liquidity facilities essentially making short-term collateralized loans that are essentially riskless are the right way. If it’s pure market dysfunction, you should be able to address it with a liquidity facility.

One source of dysfunction that was important during COVID-19 was Treasury sales by foreign central banks. These are central banks who wanted U.S. dollar reserves but didn't want long-term Treasuries anymore. Here, we could have the—I forget what it stands for—FIMA Repo Facility, the backstop repo facility that allows foreign central banks to borrow using their Treasuries. And, essentially, the idea here is we're reducing these kind of needless liquidations. That's relieving pressure on broker-dealer pipes and avoiding an unwanted jump also in term premia.

The second source of dysfunction would be unwinds of Treasury versus derivative trades. So kind of by way of background, lots of end investors—think insurers, pension funds—want exposure to kind of long-term bonds, but they want it off balance sheet either via futures or via swaps. There's a group of hedge funds who essentially accommodate this demand. They're going long Treasuries and short these derivatives, but they're highly leveraged, and after a shock, they need to unwind those trades, and they end up selling them off to dealers who are suddenly now in this long-short trade. That's tightening dealers' constraints and leading to this decline in market functioning.

Essentially, one way we could improve market functioning would be to take the pressure off of dealers. The Fed could essentially buy those Treasuries from dealers and hedge the associated interest rate risk by selling derivatives. The Fed does not need to bear any interest rate risk here. And there essentially would be an almost perfect analogy with the logic of a central bank liquidity swap.

So the kind of final thing would be essentially a proposal about how one could think about addressing future bouts of Treasury market dysfunction. First, elastically deploy liquidity facilities to support market functioning. These would follow sort of a Bagehot-like dictum and

do not require the Fed to take on any additional interest rate risk, only resort to outright purchases if there still are significant liquidations that are leading to a real incipient rise in term premium that's undesired. We're approaching the lower bound, and, essentially, the only way we can deliver monetary accommodation would be through outright purchases.

All right. So conclusion, in terms of forward guidance, think about ways to strike a better balance between commitment and flexibility. We've learned a lot about how LSAPs work but a lot we don't know. Given the uncertainty about how things work, probably spend a little bit less time thinking about the transmission from LSAPs to financial conditions and more about the second link of the chain from financial conditions to financial quantities. And then, third, be much clearer on the different goals for LSAPs and kind of lean towards a bias that liquidity facilities are the right tool for supporting market functioning. Thank you. [Applause]

ANNETTE VISSING-JORGENSEN. Thank you. One question over here. One over here. Please go ahead.

KRISHNA GUHA. Thank you. Krishna Guha with Evercore Partners. I just wanted to strike a little note of caution about sort of steps under consideration that might weaken the efficacy of forward guidance in a future ELB episode. We're looking to move away from a FAIT framework to something perhaps that's more like the old flexible inflation targeting regime. But, of course, that reintroduces the time-inconsistency problems with overshooting, as Silvana noted in her presentation.

We're also seeing good reasons to detach QE from forward guidance to a greater extent. But that takes away the "skin in the game" element and a very practical guarantee to market participants that the central bank can't adjust the interest rate very rapidly without the prior action on QE. Now, I understand the idea that we could, in principle, just do the guidance itself

correctly and completely on a standalone basis, but you can never write the complete contract given all the things that might influence the outlook and the risks. And we want to strengthen the knockout clauses, and we also want to position them in forecast space—which is subject to central bank judgments—not in outcome space.

Now, I'm very open to the idea—indeed, I suspect it is true—that the cost-benefit balance might move in that direction. But there are costs here, and I wondered if there's anything in the research that can help sort of really illuminate how large are these costs in terms of efficacy. How might they affect, for instance, the credibility of guidance, the range or horizon over which we can provide guidance, and the effectiveness of guidance not just on the risk-free rates, but on risk premia and risk-taking? Thank you.

JING YANG. Is it me? Thank you. Jing Yang from Bank of Canada. I have a question. Thank you very much for the presentation, Silvana. I have a question about the link between QE and balance sheet losses. I was very curious when you said if QE is successful, it should lead to balance sheet losses because it lifts the economy out of the ELB. I would have thought the link between the two doesn't have to be there.

If you look at QE post–Great Financial Crisis, that has not led to balance sheet losses. It's quite the contrary. We all had balance sheet gains in most of the central banks that have done QE. The reason we had balance sheet losses this time is because of the rapid increase in interest rate, which was caused by the inflation surge. Thus, I think for a central bank to lift the economy out of the ELB does not necessarily have to link with the inflation surge. That's balance sheet losses. I'm just curious about your response. Thank you.

MARKUS BRUNNERMEIER. You have some question about the after-effects of QE in a sense that when you do QE, you take, of course, duration risk out of the private sector. And,

subsequently, when you want to slow down the economy, you have to move much more aggressively on the interest rate. And would you agree the fact that the Fed moved so aggressively subsequently without triggering a recession was because QE moved a lot of duration risk out of the financial sector?

And, generally, I would like to know, have you thought about the optimal Fed balance sheet size in this context? What should we do for just an optimal size? Or perhaps this goes beyond the task you were assigned to. Thanks a lot. Great presentation and great discussion.

SILVANA TENREYRO. Thank you. These are great questions. Let me start with Krishna. You said we wanted to detach QE from forward guidance? No. Forward guidance is about guidance on the rates, guidance on the asset purchases. So we don't want to detach them. What we wanted to detach, to the extent that is possible, is the interest rates from asset purchases so that you effectively have these two tools that you can use, not necessarily fully aligned. Otherwise, I mean, if they're—

KRISHNA GUHA. But that might still weaken the credibility of—

SILVANA TENREYRO. So there's the other aspect that you mentioned that, by having more flexibility in your forward guidance, you might lose some of the effectiveness. And, again, it's tradeoff territory. And this is why we suggest "do the scenario analysis." It might be that doing that scenario analysis the Fed decides, "Well, we actually want to go for the high effectiveness, and we want to discount the flexibility to exit." And that's fine. But you want to do that and be aware of the costs and risks you are undertaking by following that particular guidance. So that's all. It might be that, again, if we rewind, the Fed would have still taken the same decisions. And that's fine. It's tradeoff territory, and there's a judgment on how much weight you put on those costs and risks.

On Jing, so I made the point that—and maybe it's consistent with what you're saying—if you are doing asset purchases for financial stability purposes, you will likely be buying bonds when the spreads are very high. And so once you unwind these policies, you're making big gains in your balance sheet. And maybe that's what happened with the financial crisis, and that's why central banks were not making losses at the time.

But then if you think about just doing QE asset purchases for monetary policy purposes and you are getting the economy out of the ELB, you actually will make losses in your balance sheet. So making just that discussion, now I also want to emphasize that these balance sheet losses, in the big scheme, might be very small compared to the broader macroeconomic benefits of taking the economy out of a crisis or out of a deep recession. So that's the perspective that one can gain by having a framework with this cost and benefits analysis embedded in it.

Markus, my jet lag is not helping me, but your final question was—I mean, you asked a couple. Let me go for the second that I remember. You asked about the size of the balance sheet and the optimal size of the balance sheet. That should be primarily a financial stability consideration. And, as a central bank, you want to make sure that you cover the liquidity needs of the financial systems in normal times. And so you want to ask banks and nonbanks how much liquidity they would need.

And you also need to have a precautionary amount of reserves to deal with a crisis because that's an important part of the central bank's function. That might be harder to assess, and there will be judgment on how much precautionary—what's the precautionary size of the balance sheet. And then there would be, yeah, speculative demand for reserves bearing with the interest rate. So you need to have these three elements. And, again, perhaps the first one related to the micro prudential function should be easier to gauge from just asking banks directly. The

precautionaries will depend on your stress tests and what are the risks you are considering. But, yeah, I see it more as a financial stability issue from the monetary policy perspective. I don't think there is any constraint there.

ANNETTE VISSING-JORGENSEN. Let's do another round of questions. Alp has a question here and then Ricardo over here.

ALP SIMSEK. Hi. Great presentation and discussion. Both of you emphasized that in terms of their macro stimulus, these policies work through financial conditions. And you have also both emphasized that the effect of these policies on financial conditions is highly uncertain and can change over time. I would think these two observations would naturally imply there might be benefits to make these policies contingent on financial conditions. In particular, the escape clause should probably include financial conditions.

So if you start the QE program, say, to ease financial conditions to a particular level, if it doesn't ease enough, you want to increase the size of the program, or initial easing means reverse—you want to increase the size of the program. But if it eases too much relative to your intentions, you want to automatically slow down the size of the program or maybe start tapering. So I think this might give you better control over financial conditions, which seems to be the key channel by which these policies work.

RICARDO CABALLERO. Actually, I want to make a comment on Markus's question. I understood it a little differently. I understood it as saying, look, QE draws duration from the market, and therefore, during the recovery phase or when you want to tighten, you're not going to be very effective because you have reduced duration. But remember that this happened in a context in which we had also massive fiscal expansion. So we have lots of injections of duration

from some other places, which raises a more general issue whether you want to sort of consider the whole balance sheet of the private sector, not only the central bank's.

SILVANA TENREYRO. That was the first question, and I only answered the second. But thank you, Ricardo.

ANNETTE VISSING-JORGENSEN. Okay. Janice Eberly, please?

JANICE EBERLY. Just a follow-up to Sam's observations about the Kashyap, Stein, Wallen, and Younger proposal to use futures or swaps for the market-functioning facilities—the point that Silvana initially raised was about distinguishing between market-functioning interventions and QE. And this proposal does that by using a different instrument. But by doing that, using a different instrument, it goes further than distinguishing sort of from a messaging perspective because it also doesn't put anything on the balance sheet, right? And so Sam pointed that out, but the proposal does more than what was initially—what the mandate asked for. So I think it's important to keep those two things separately because you could, in principle, accomplish the messaging distinction without using a different instrument.

SILVANA TENREYRO. Yeah. Just on this point, I mean, I think it's a very interesting proposal and has many aspects that are very promising. If the problem is basis trade, I think it's a very clever solution. I'm less sure that the financial crisis, the Global Financial Crisis, was about basis trade, probably. Yeah, it was more of an issue during the COVID pandemic. But it's definitely a very interesting proposal that would tackle this friction very well. I think Sam wanted to answer the other questions.

SAMUEL HANSON. Yeah, so actually—well, so Jing, I completely agree. Their proposal is not just distinguishing. I think it's sort of taking that to the logical limit. And if you really do believe that there are these two different goals, it actually implies kind of a functional

separation that you can improve market functioning. If it is market functioning, you should be able to do that without bearing risk. I understand that setting up a facility that would be shorting Treasury futures might be a bridge too far [laughter], but I think the idea that it can be done that way does speak to this kind of important—it's not just a distinct thing. It should actually logically require a different instrument. And, yeah, that's kind of why I made this foreign exchange intervention versus liquidity slop. It's almost perfectly parallel.

Alp, to your point on financial conditions, I mean, actually, there's been a recent literature. Tyler Muir, Valentin Haddad, and Alan Moreira have kind of a series of papers—and, actually, whatever, Adi, Jeremy, me, and Eric Zwick had one as well—kind of making this point that, to the extent that asset purchases themselves are responding to financial conditions, that kind of plays essentially kind of an automatic stabilizing role in markets. I think the way that the literature has seen it is that has not been made explicit, but the market certainly implicitly understands that if there's a severe unwanted tightening of financial conditions, that the Fed will probably try to ease financial conditions in some way. So I don't know if it needs to be made explicit. Yeah, I would be pretty uncomfortable with a trigger based on the Moody's triple-B spread or anything concrete, but my sense is there's already a significant implicit element of that.

ANNETTE VISSING-JORGENSEN. Okay, one more round of questions. We had one question over here, please—and then one over here.

MAKOTO KASAI. I'm Makoto Kasai from the Bank of Japan. And thank you for your time and presentation. As you know, we have implemented various unconventional tools, but still, we have a lot to learn. And I'm very curious or interested in your idea about the stress-testing. And do you think that publishing the result of such a stress test will enhance the effectiveness of such tools, or do you think it should be kept internally?

JONATHAN PINGLE. Yeah. Yeah. Just to push a little bit on Krishna—Jonathan Pingle—just asking, in terms of the Odyssean forward guidance, the desire for more flexibility, the “and” versus “or,” when we think about state-contingent forward guidance, there is probably some power to that in the commitment. But isn’t some of the flexibility really just addressed with a clear escape clause, say, like the Evans rule, like, if it was “and maximum employment and inflation above target” or inflation, say, over 2½ percent, then we can proceed with liftoff? And I’m just curious, like, how much of the concerns about not enough flexibility can be mitigated with an effective escape clause in state-contingent forward guidance?

MARK GERTLER. Very interesting. All of the exposition was in terms of asset purchases, but we’ve been in a world of quantitative tightening. And I’m just wondering how we should think of that. Are things symmetric, or could there be some interesting asymmetries? And what I have in mind is, okay, we saw a rise in short-term rates. Bank portfolio securities holdings took a hit; okay, that weakened them. So if we wanted to—when doing tightening, you’re selling more long-term securities on the market. So could there be some financial stability considerations on the tightening side?

ANNETTE VISSING-JORGENSEN. All right. Let’s just have one from Bill English before we get a reply.

WILLIAM ENGLISH. Thanks very much. I had a question for Silvana. You raised kind of the possibility that there should be in the framework some way of incorporating losses on QE into QE decisions or something like that. But I wasn’t entirely sure what you had in mind. And anything more you could say on how that should be rolled into the framework would be very interesting.

SILVANA TENREYRO. Okay. So yeah, let me start with the first question. This stress-testing I'm thinking of done is internally for the purposes of having a robust policy, a robust forward guidance or asset purchases. It's just thinking about potential scenarios that might make the guidance obsolete very quickly. You want to have that robust. But I'm not thinking about publishing this stress test, and it would be of limited interest for the general public or even market participants how you came up to that decision. I think it would just add more noise than help there.

I think, again, on the escape clause, again, we're proposing having a clearly integrated escape clause that could help with that flexibility. And, again, you might lose some of the effectiveness we were talking about but, on the other hand, will give you that state contingency that will be helpful if you were to face a rapid change in environments.

To Mark, yeah, I mean, I think we typically think about interventions for financial stability purposes as when markets are very dysfunctional or in stress. And, ideally, you do quantitative tightening slowly so that you don't disrupt those markets, and, possibly, I mean, there is an asymmetry there. And having QT done slowly and in the background seems like a reasonable way to proceed.

Bill, I don't suggest considering the losses in the framework. I'm just saying having a framework in which you can quantify them and contrast them with the other benefits would be helpful for transparency and to communicate, again, to Congress and to the public: "This is the cost, the fiscal side of it," and the very limited fiscal side because it doesn't include the gains in extra tax incomes, et cetera, et cetera.

But—so at least we'll put the discussion that is happening outside of central banks into context and into perspective, and then people can judge these are the costs relative to these

macroeconomic benefits. But I don't think it has to be part of the Fed's or the central bank's consideration. Ideally, you don't want the central bank to be concerned with the fiscal aspect of this. I mean, that's part of independence. And, yeah, it's only to inform the public about a discussion that is already happening outside and sometimes not in a helpful way.

ANNETTE VISSING-JORGENSEN. Does anyone have any last burning questions?

SILVANA TENREYRO. I think Sam wants to say something.

SAMUEL HANSON. I was just going to say, I mean, Mark, to quantitative tightening, I think most of our theories suggest—these are our theories—that it should be rather symmetric. The biggest—the only kind of main difference would be to the extent that you believe that kind of short-term demand curves in markets are steeper than long-term demand curves. When you're purchasing, it's unexpected. You're kind of catching the market off guard, and you're hitting that kind of steeper short-term demand curve. Whereas when you're selling, it's so slow that you're on the kind of flatter part of the curve. But I think also the literature is just focused less on quantitative tightening because it would be like doing a study on watching paint dry. There's just nothing that we could ever detect in asset prices to see. Yeah, you could be like, is there quantitative tightening today? You'd have no way of detecting it, sitting there at your Bloomberg terminal, so.

ANNETTE VISSING-JORGENSEN. All right. Thank you very much.

SILVANA TENREYRO. Thank you. [Applause]