

## *General Discussion*

Arvind Krishnamurthy commented on the signaling effects described by Sydney Ludvigson and noted that, from previous research, we know that quantitative easing (QE) has important implications for the signal of the path of the policy rate. He interpreted Ludvigson's results as contributing additionally to this by showing that quantitative tightening (QT) announcements change the way in which the market interprets the aggressiveness of the Federal Reserve's policy rate reaction function. On Jonathan Wright's analysis, Krishnamurthy commented that while the Fed ramps up QE rapidly, it exits very slowly—the ratchet effect that Viral Acharya has written about. Tying QE to policy rates, he explained that as long as policy rates are kept low, the balance sheet will be kept high and that around the world this is what central banks have roughly done.

Commenting on Krishnamurthy's analysis of the particular effectiveness of policy during times of distress, the state dependence as well as how conventional and unconventional policy work in different ways, Ludvigson remarked that it is very difficult to replicate accommodative monetary policy at the lower bound with QE. Pointing to the issue of channels to the broader economy, Ludvigson noted that unconventional policy may remove tail risk while conventional policy may push more on the means of the distribution. She wondered whether Krishnamurthy's interpretation of a Fed put was consistent with this.

Krishnamurthy responded by suggesting the Fed put is likely in play and that its actions in a tail state are being signaled through the Fed's announcements.

Wright remarked that event studies have taught us a lot, but if we believe QE and QT are different—QE removes tail risk while QT may not—one should differentiate between announcements related to QE and those related to QT. On Ludvigson's results, Wright thought that the tapering announcements were not directly about balance sheet shrinkage but rather announcements about how QE was not going to last indefinitely. Wright concluded by saying that event study evidence that does not borrow the inference that QT is the opposite of QE would be useful but admitted that this is hard to do.

Michael Kiley disagreed with Krishnamurthy's characterization of the views of central bankers, and especially of Federal Reserve analyses, in which Krishnamurthy argues such institutions' policy approach is misguided and based on a view that QE and policy interest rate changes are very close substitutes. Kiley offered three supporting points. First, research published by the Federal Reserve System staff suggest that QE is not a perfect substitute for the federal funds rate; for example, research on the broad versus narrow channels of QE is dominated by Fed researchers and often emphasizes the narrow channel.<sup>1</sup> Kiley explained that this work also informs how simulations are run in—for example, the FRB/US model—and emphasized that the notion that QE is not a perfect substitute for the federal funds rate is often incorporated in such simulations.<sup>2</sup> Similarly, Kiley continued, research using a dynamic stochastic equilibrium model, as in early work by Edward Nelson and David Lopez-Salido among others, also directly incorporates this imperfect substitutability.<sup>3</sup> He summarized by saying that he does not agree with Krishnamurthy's analysis that the prevalent policy approach is somehow fundamentally flawed but he admitted that we have much more to learn on what good QE rules are.

1. For example, Stefania D'Amico and Thomas B. King, "Flow and Stock Effects of Large-Scale Treasury Purchases: Evidence on the Importance of Local Supply," *Journal of Financial Economics* 108, no. 2 (2013): 425–48.

2. For example, Michael T. Kiley, "Quantitative Easing and the 'New Normal' in Monetary Policy," *The Manchester School* 86, no. S1 (2018): 21–49, <https://doi.org/10.1111/manc.12238>.

3. For example, Javier Andrés, J. David López-Salido, and Edward Nelson, "Tobin's Imperfect Asset Substitution in Optimizing General Equilibrium," *Journal of Money, Credit and Banking* 36, no. 4 (2004): 665–90, <http://www.jstor.org/stable/3839037>; and Michael T. Kiley, "The Aggregate Demand Effects of Short- and Long-Term Interest Rates," *International Journal of Central Banking* 10, no. 4 (2014): 69–104.

Robert Hall distinguished between two parts in the discussion. Hall pointed out that QE is used for the Fed to put out fires in particular asset markets—the emergency move is always to purchase bonds, not to sell them, giving rise to the asymmetry we see in the literature. Regarding the debate on the optimal size of the Federal Reserve balance sheet, Hall noted that he belongs to the school that does not necessarily think the balance sheet needs to shrink. He then commented that the Fed is very active in the repo market, which is an important tool that does not get much attention. Hall concluded by arguing that the most important issue is coordination with the Treasury in terms of the maturity of reserves, stating that while the Fed prefers the federal debt to be funded in the overnight market, the Treasury likes to borrow long.

Jason Furman wondered whether the analysis by the panelists had any relevance for macroeconomic questions, including unemployment and inflation, and noted that he had interpreted the panelists response as a tentative “no.”

Kristin Forbes asked the panelists if they had any thoughts on how other countries’ monetary policies may affect the United States and noted that the situation today is very different than in 2017 because multiple countries around the world are now unwinding their balance sheets simultaneously.

Jonathan Pingle wondered whether the panelists were concerned about the speed with which the balance sheet is shrinking, substantially compressing the time between warning signs and stress.

Donald Kohn said that the 2013 taper tantrum was also primarily the result of the markets interpreting impending QT as a monetary policy signal, and the experience unfortunately contributed to a lot of inertia in the Fed’s more recent response—when, how fast, and how to announce tapering in 2021. Kohn stated that there are other ways of signaling future monetary policy, however, which are more actively used today and allow the Fed to worry less about a taper tantrum now than would have been true in 2013. The equilibrium level of reserves and the volatility getting there depend importantly on the regulatory environment, he continued, noting that the demand for reserves depends partly on the liquidity regulations, and the Fed can do a lot to lower the demand for reserves by carefully structuring its financial stability regulations. Kohn argued that the leverage ratio is constraining dealers and that more needs to be done to make the Treasury market more liquid.

Joe Beaulieu was puzzled by what he interpreted as the ongoing angst about the QT ramp-up, even though it seems to be a done deal.

Jonathan Parker suggested that conventional policy also seems to have disproportionate effects. To the extent that QE does have unusual power, it is presumably because the market has the infrastructure and volume to manage policy-induced changes in short-term interest rates and their effects propagate smoothly across markets. Parker stated that what makes QE special is not the particular asset being purchased but the infrequency of its implementation and the policies and information that accompany the announcement of asset purchases. He argued that the Fed could likely steer the economy largely by intervening between reserves and long-term assets, rather than short-term assets. He summarized, stating that what is particular about QE is that it is infrequent and seems to act in the market more as if it were a surprise. Thus, the effects of QT may be quite different because it is a slow and expected policy which allows markets to be better prepared. Commenting on Ludvigson's results on the price response to inflexibility, Parker thought it would be interesting to distinguish between two different types of inflexibility: inflexible discretionary policy and rule-based inflexibility.

Hanno Lustig addressed Wright's finding of a small effect of QT—25 basis points—saying that he struggled to reconcile this result with recent events in the bond market. He provided the example of the ten-year TIPS (Treasury inflation-protected securities) yield and stated that the real yields have gone up by about 150 basis points in a matter of months. He concluded that while the Fed has started conventional monetary policy, this should have negligible effects ten years from now, leaving open the question of what may account for this dramatic move.

Benjamin Friedman had a general observation, saying that comments suggesting that quantitative actions do not have a proper theory puzzles him. Friedman offered the standard Markowitz and Tobin asset pricing models as examples of existing frameworks. He then argued that central banks should be prepared to use QT deliberately in specific circumstances. Leading up to the Great Recession with an overheated housing market, the standard story is that the interest rate was too blunt an instrument to attack overheating in one sector of the economy. But, Friedman contended, if the Fed had deliberately sold a substantial amount of its mortgage-backed securities, targeting the housing market specifically, the instrument would not have been blunt at all. Friedman suggested that the Fed keep a healthy supply of certain assets on its balance sheet to be able to implement QT in a targeted way when necessary.

Annette Vissing-Jorgensen first addressed the question of the scope of possible QT and noted that she had reestimated the amount of feasible

runoff with results that are quite a bit higher than those presented by Wright.<sup>4</sup> Second, Vissing-Jorgensen pondered the extent to which QT should be used actively or passively. One possibility would be to use QT simply to shrink the balance sheet in preparation for the next downturn, opening up the possibility for more QE; the other possibility is to use it actively in a manner similar to the short rate. Vissing-Jorgensen noted that there has not been a lot of research or debate on the effectiveness of QT and called for more work on the issue.

4. David Lopez-Salido and Annette Vissing-Jorgensen, "Reserve Demand and Quantitative Tightening," working paper (2022), [https://drive.google.com/file/d/161MMKn4pqRJTA Y26ZaCF\\_1cMOYFpwOVy/view](https://drive.google.com/file/d/161MMKn4pqRJTA Y26ZaCF_1cMOYFpwOVy/view).