

Monetary Policy at the Zero Lower Bound

Conference Summary

This summary describes papers presented at the “Monetary Policy at the Zero Lower Bound” conference held February 25, 2011, at the Federal Reserve Bank of San Francisco. Conference papers are listed at the end and are available online at <http://www.frbsf.org/economics/conferences/1102/agenda.php>.

The topic of the Federal Reserve Bank of San Francisco’s annual macroeconomics conference this year was “Monetary Policy at the Zero Lower Bound.” Conference papers explored the effects of Federal Reserve long-term bond purchases on longer-term interest rates; improvements to macroeconomic models to better account for the zero bound; and optimal monetary policy at the zero bound. Although the zero lower bound is a substantial constraint on traditional monetary policy, the Fed still has other policy options available that can improve U.S. economic performance.

On December 16, 2008, the Federal Reserve’s Federal Open Market Committee (FOMC) lowered the target for the federal funds rate to essentially zero in response to the most severe financial crisis since the Great Depression. Since U.S. currency carries an interest rate of zero, it is virtually impossible for the FOMC to target a value for the federal funds rate that is substantially below zero. Faced with this zero lower bound on its traditional monetary policy instrument, the Federal Reserve has looked for alternative ways to stimulate the weak U.S. economy, such as by purchasing large quantities of longer-term U.S. Treasury securities. In March, the Federal Reserve Bank of San Francisco hosted researchers from the Federal Reserve, academia, and central banks around the world to discuss the latest research on monetary policy at the zero lower bound.

The effectiveness of Federal Reserve bond purchases

On several occasions between 2008 and 2011, the FOMC sought to lower longer-term interest rates by purchasing large quantities of longer-term Treasury bonds or mortgage-backed securities. Three papers at the conference investigated the effectiveness of these programs.

In finance theory, most asset-pricing models do not have a channel by which the quantity of Treasury securities at different maturities can affect interest rates. [Hamilton and Wu \(2011\)](#) modify a standard asset-pricing model so that the quantity of longer-term Treasury securities can potentially play a role. Building on earlier work by [Vayanos and Vila \(2009\)](#), Hamilton and Wu assume there are a variety of heterogeneous investors with preferences—or “preferred habitats”—for different bond maturities. In the model, arbitrageurs trade bonds of different maturities, but they do not completely eliminate bond pricing imperfections because arbitrageurs are risk-averse and have limited resources. If the quantity of long-term bonds in the open market is reduced, then preferred habitat investors bid up the prices of those bonds as they become scarcer. Thus, longer-term interest rates fall. Hamilton and Wu estimate that the Federal Reserve’s “QE2” program in 2010–11, which withdrew about \$600 billion of longer-term Treasury securities from the open market, reduced the 10-year Treasury yield by about 17 basis points. Their results also imply that, if the Fed had purchased even longer-maturity Treasury securities than it did in QE2, then longer-term yields would have fallen by an even greater amount.

[D’Amico and King \(2011\)](#) analyze the Fed’s purchases of \$300 billion of longer-term Treasury securities between March and October of 2009, which might be called the “QE1” period. They collect detailed data on the wide range of Treasury securities that were eligible for purchase by the Fed, and then compare the behavior of yields on those securities that ultimately were purchased by the Fed with those that were not. D’Amico and King find that, on average, each Fed purchase of longer-term Treasury securities caused a 3.5 basis point fall in the yield of that security. Considered as a whole, they estimate that the program

resulted in a persistent downward shift in longer-term Treasury yields of about 30 to 50 basis points, a large effect. The authors note that their results support term structure models that allow some role for market segmentation or preferred habitat investors, as in Vayanos and Vila (2009) and Hamilton and Wu (2011).

[Krishnamurthy and Vissing-Jorgensen \(2011\)](#) study both the Fed's QE1 and QE2 bond-buying programs carried out in 2008–09 and 2010–11. They provide a theoretical decomposition of the effectiveness of Fed bond purchases into several different channels, and use evidence from a variety of financial markets to assess the importance of each channel. They find that both QE1 and QE2 had significant effects on longer-term Treasury yields, but a smaller effect on corporate bond yields. That is, the pass-through from Fed purchases of longer-term Treasuries to longer-term private-sector borrowing rates was only partial. Krishnamurthy and Vissing-Jorgensen also find that QE1—which purchased mortgage-backed securities as well as Treasuries—had a larger effect on mortgage rates than did QE2. This suggests that purchases of securities other than Treasuries, such as mortgage-backed securities, may be a more effective way for the Fed to reduce interest rates that matter to the private sector.

Macroeconomic models and the zero lower bound

The other three papers at the conference considered various aspects of macroeconomic models and the zero lower bound.

Prior to the 2008 financial crisis, a wide range of macroeconomic models projected only a very small chance that the U.S. economy would run up against the zero bound. Even if the United States were to hit the zero bound, these models suggested it would do so only for a few quarters before recovering. [Chung et al. \(2011\)](#) re-examine these models to determine whether economists adequately accounted for any unobserved factors and uncertainty about model parameters. The authors find that previous studies did not adequately take into account these additional sources of uncertainty and that previous work should have

expected the zero lower bound to be a more frequent constraint. Nevertheless, even taking these additional sources of uncertainty into account, Chung et al. find that the models view the recession of 2008–09 as very unlikely because of its size and persistence. The authors conclude that these models are too “well-behaved” in that they bounce back too quickly from even very substantial economic shocks. Thus, future work should focus on the features of these models that propagate shocks and make them more persistent.

[Eggertsson and Krugman \(2011\)](#) take a step in this direction by adding a debt-deleveraging channel to a basic macroeconomic model. In the model, a tightening of lending standards forces households to cut spending dramatically, plunging the economy into a recession. If the shock is large enough, the economy runs into the zero lower bound and the recession becomes much worse. The economy falls into deflation, which makes the real debt burden on borrowers even worse, forcing another round of deleveraging and economic contraction. In this model, countercyclical fiscal policy becomes more powerful than usual, because Ricardian equivalence no longer holds. That is, even if households worry that future taxes must rise to cover the costs of current fiscal stimulus, so many households are constrained by their tightened borrowing limits that they would still prefer fiscal stimulus now. In the model, the stimulus even pays for itself by jump-starting the economy and preventing further rounds of deleveraging and deflation.

[Brendon, Paustian, and Yates \(2011\)](#) also consider a standard macroeconomic model modified by including borrowing constraints. In the model, the central bank can purchase securitized loans on the open market as well as set short-term interest rates. When short-term interest rates are constrained by the zero bound, this second monetary policy instrument has large economic benefits, especially if monetary policymakers have difficulty committing to forward guidance for the short-term interest rate. In the model, although the zero lower bound still hurts the economy’s performance, the severity of the constraint is substantially reduced by the central bank’s ability to purchase securitized loans and help keep credit flowing.

Summary

The zero lower bound places a substantial constraint on a central bank's ability to use short-term interest rates to stabilize the economy. However, recent research suggests that the Federal Reserve still has other monetary policy options available. The Fed's purchases of longer-term Treasury and mortgage-backed securities seem to have successfully reduced longer-term interest rates. At the same time, though, there is some evidence that Treasury securities purchases in isolation may only partially pass through to private-sector borrowing rates. Theoretical models suggest that central bank asset purchases can help keep credit flowing in an economy that would otherwise be stuck at the zero lower bound. Even though the zero bound may be a more serious constraint than economists previously realized, papers presented at the conference suggest that the Fed still has policy options that can improve U.S. economic performance.

Conference papers

Brendon, Charles, Matthias Paustian, and Tony Yates. 2011. "Optimal Conventional and Unconventional Monetary Policy in the Presence of Collateral Constraints and the Zero Bound." Unpublished manuscript.

http://www.frbsf.org/economics/conferences/1102/Brendon_Paustian_Yates.pdf

Chung, Hess, Jean-Philippe Laforte, David Reifschneider, and John Williams. 2011. "Have We Underestimated the Likelihood and Severity of Zero Lower Bound Events?" Forthcoming in *Journal of Money, Credit, and Banking*.

<http://www.frbsf.org/publications/economics/papers/2011/wp11-01bk.pdf>

D'Amico, Stefania, and Thomas King. 2011. "Flow and Stock Effects of Large-Scale Treasury Purchases." Federal Reserve Board Finance and Economics Discussion Series 2010-52 (revised).

<http://www.frbsf.org/economics/conferences/1102/amico-king.pdf>

Eggertsson, Gauti, and Paul Krugman. 2011. "Debt, Deleveraging, and the Liquidity Trap." Unpublished manuscript.

http://www.frbsf.org/economics/conferences/1102/PKGE_Feb14.pdf

Hamilton, James, and Jing (Cynthia) Wu. 2011. "The Effectiveness of Alternative Monetary Policy Tools in a Zero Lower Bound Environment." Unpublished manuscript.

<http://www.frbsf.org/economics/conferences/1102/Hamilton-Wu.pdf>

Krishnamurthy, Arvind, and Annette Vissing-Jorgensen. 2011. "The Effects of Quantitative Easing on Long-Term Interest Rates." Unpublished manuscript.

<http://www.frbsf.org/economics/conferences/1102/KrishnamurthyVissingJorgensen.pdf>

Reference

Vayanos, Dimitri, and Jean-Luc Vila. 2009. "A Preferred-Habitat Model of the Term Structure of Interest Rates." *NBER Working Paper* 15487.