

## When Will the Fed End Its Zero Rate Policy?

BY JENS CHRISTENSEN

U.S. Treasury yields and other interest rates increased in the months leading up to the Federal Reserve's December 2013 decision to cut back its large-scale bond purchases. This increase in rates probably at least partly reflected changes in what bond investors expected regarding future monetary policy. Recent research on this episode tentatively suggests that investors moved earlier the date when they believed the Fed would exit its zero interest rate policy, even though Fed policymakers made few changes in their projections of appropriate monetary policy.

The severe shock of the 2007–08 financial crisis prompted the Federal Reserve to quickly lower its target for its primary policy rate, the overnight federal funds rate, near to zero, where it has remained since. Despite this highly stimulatory stance of conventional monetary policy, the economic recovery has been sluggish and inflation has been low. For that reason, the Federal Open Market Committee (FOMC), the Fed's policy body, has provided additional monetary stimulus by using unconventional measures to push down longer-term interest rates. One element of this unconventional policy has been large-scale asset purchases (LSAPs). Another has been public guidance about how long the FOMC expects to keep its federal funds rate target exceptionally low. The effect of this forward guidance depends on how financial market participants interpret FOMC communications, in particular when they expect the Fed to exit from its near-zero rate policy, a shift often called “liftoff” (see Bauer and Rudebusch 2013).

This *Economic Letter* examines recent research estimating when bond investors expect liftoff to take place (see Christensen 2013). This research suggests that bond investor expectations for the date of exit have moved forward notably in recent months, probably because they anticipated the FOMC's decision at its December 2013 meeting to cut back large-scale asset purchases. This research suggests that market participants expect the FOMC to start raising rates in the spring of 2015, but the exact timing is highly uncertain.

### Unconventional monetary policy

Unconventional monetary policy designed to put downward pressure on longer-term interest rates has two aspects: large-scale asset purchases and forward guidance, that is, Fed communications about its expectations for future policy. LSAPs affect longer-term interest rates by shifting the term premium, the higher yield investors demand in exchange for holding a longer-duration debt security (see Gagnon et al. 2011). LSAPs were first announced in late 2008. The most recent program, initiated in September 2012, originally involved purchasing \$40 billion in mortgage-backed securities (MBS) every month. It expanded in December 2012 to include \$45 billion in monthly Treasury security purchases. The FOMC stated that it intended to continue the program until the outlook for the labor market improved substantially, provided inflation remained stable. Since then, the labor market has improved and the unemployment rate has

dropped. As a result, the FOMC decided at its December 2013 meeting to reduce the pace at which it adds to its asset holdings to \$75 billion per month.

Forward guidance affects longer-term rates by influencing market expectations about the level of short-term interest rates over an extended period. In August 2011, the FOMC stated that it intended to keep its federal funds rate target near zero until mid-2013, the first time it projected a liftoff date. More recently, Fed policymakers have indicated that they anticipate keeping the federal funds rate at that exceptionally low level at least as long as the unemployment rate remains above 6½%, inflation one to two years ahead is projected to be no more than one-half percentage point above the FOMC's 2% longer-run target, and longer-term inflation expectations remain in check. In December 2013, the FOMC added that, based on current projections, it expects to maintain the zero interest rate policy well past when the unemployment rate falls below 6½%.

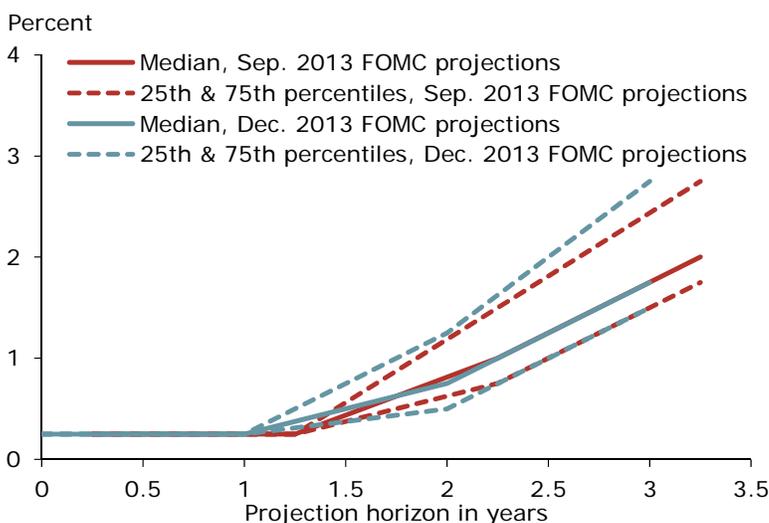
### FOMC projections versus Treasury market data

Forward guidance also includes a set of projections on future federal funds rate levels that each FOMC participant makes four times per year, released in conjunction with the FOMC statement. Based on their views of appropriate monetary policy, these policymakers also forecast overall inflation; core inflation, which excludes volatile food and energy prices; the unemployment rate; and output growth. Figure 1 shows FOMC median, 25th percentile, and 75th percentile federal funds rate projections made in September and December. Only minor changes occurred from September to December.

The relatively stable FOMC projections stand in contrast to changes in the U.S. Treasury bond market over the same period. Figure 2 shows the Treasury yield curve, that is, yields on the full range of Treasury maturities, on the days of the September and December 2013 FOMC meetings as well as the December 27 reading. (The research is based on weekly Treasury yields recorded on Fridays. December 27 was the last Friday in 2013.) Medium- and longer-term Treasury yields increased notably during that period.

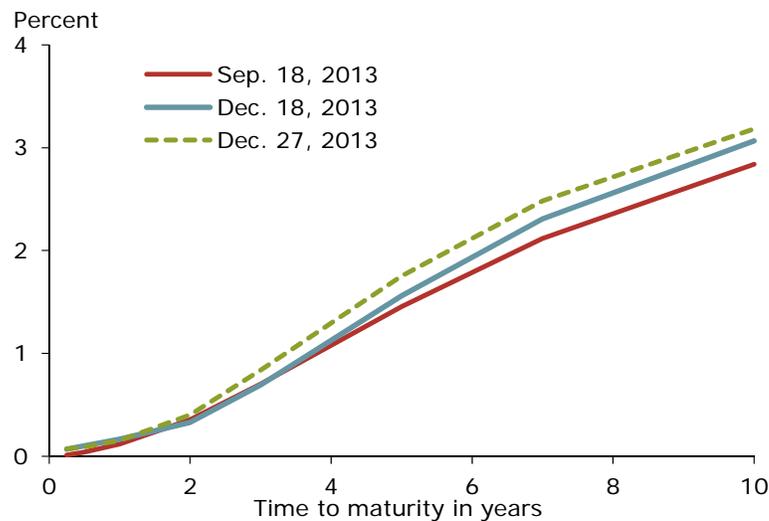
**Figure 1**

#### FOMC member projections of appropriate policy rate



**Figure 2**

#### Treasury yield curves on three dates in 2013



Other analysis suggests that much of this increase in longer-term Treasuries reflected an increase in the term premium. But did the rise in longer-term rates also involve a shift in the market's views about expected short-term rates that seems out-of-step with FOMC guidance? To address this question, I use an innovative model of the Treasury yield curve developed in Christensen (2013) that delivers a distribution of estimates derived from Treasury security prices for the exit from the zero interest rate policy.

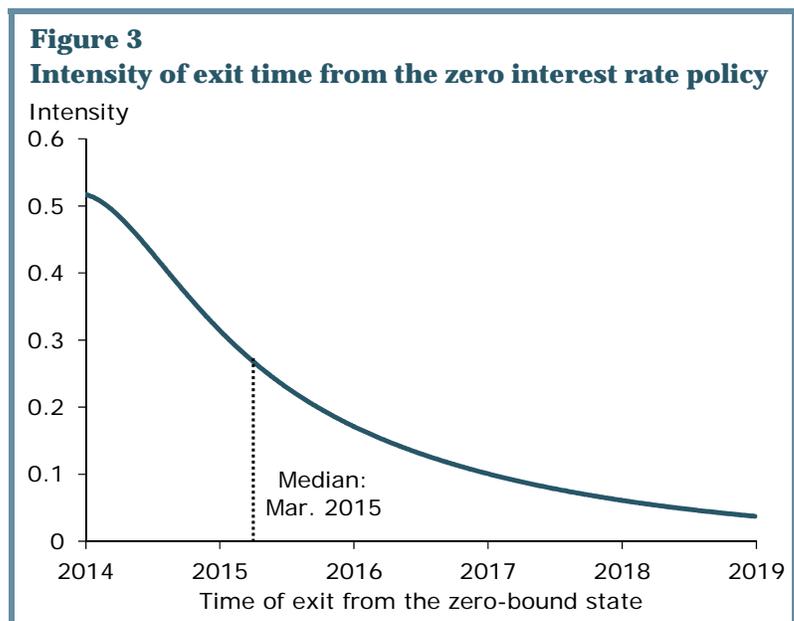
### A model of the Treasury yield curve

In this model, it is assumed that the economy can be in one of two states: a normal state like that which prevailed before December 2008, and a state like the current one in which the monetary policy rate is stuck at its lower bound near zero. In the normal state, yield curve variation is captured by three factors that are not directly observable, but can be derived from the underlying data: the general level of rates; the slope of the yield curve; and the curvature, or shape, of the yield curve. Furthermore, it is assumed that, in the normal state, investors consider the possibility of the policy rate reaching zero to be negligible. This assumption implies that the transition to the zero-bound state that occurred in December 2008 was a surprise and did not affect bond prices before that, when the economy was in the normal state.

The zero-bound state is characterized by two key features. First, the shortest rate in the Treasury bond market is assumed to be constant at zero. Second, the state is viewed by bond investors and monetary policy makers as undesirable and temporary. They believe that the FOMC would like to return to normal as quickly as possible, consistent with the Fed's price stability and maximum employment mandates. This implies that news about the U.S. economy prompts bond investors to revise their views about when the FOMC is likely to exit from its zero interest rate policy. In the model, that exit defines the transition from the zero-bound state to the normal state of the economy. One component of the variation of Treasury bond yields in the zero-bound state is how probable bond investors believe a return to the normal state to be. However, because bond investors are forward looking and consider the possibility of such a shift when they trade, the three factors that affect the yield curve in the normal state continue to affect it in the zero-bound state.

### Results

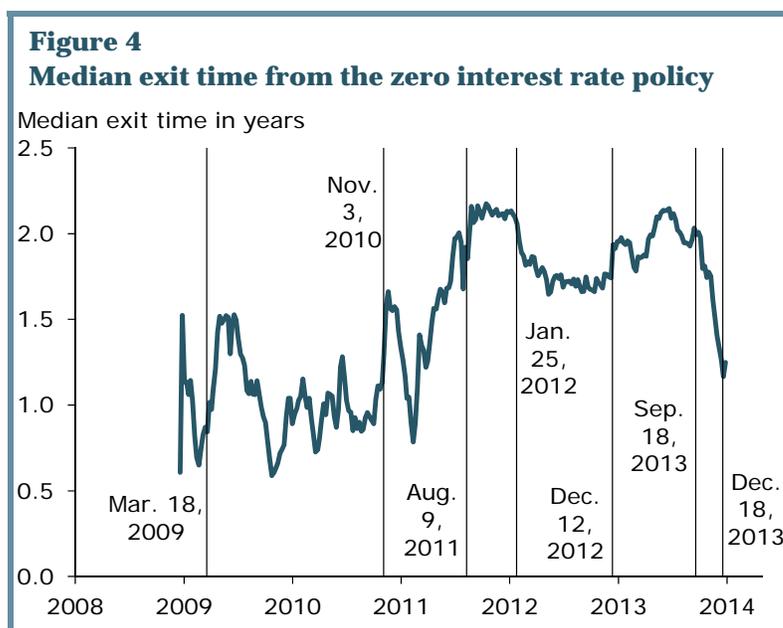
To derive estimates of the date of the FOMC's first federal funds rate increase, I use weekly Treasury yields starting in January 1985 of eight maturities ranging from three months to ten years. The novel feature of the model I use is consideration of the implicit probability bond investors attach to a transition back to the normal state. This allows the entire distribution of probable dates of exit from the zero-bound state to be examined. Figure 3 shows the likelihood of leaving the zero-bound state at any point in time as of December 27, 2013. The exit date distribution is heavily skewed so that very late exit times are significantly probable. Still, the median exit date is in March 2015. In other words, the economy is just as likely to remain in the zero-bound state at that date as to



have exited before it. One takeaway is the considerable level of uncertainty about the exit date. The model suggests that there is about a one-in-three chance of remaining in the zero-bound state past 2015.

Figure 4 shows the variation in the estimated median exit time since December 16, 2008, when the economy shifted to the zero-bound state.

Included are five dates from 2009 to 2012 of major FOMC announcements regarding LSAPs or guidance about future monetary policy. The estimated median exit time from the zero-bound state moved notably later in the weeks after each announcement, except when the FOMC extended its forward guidance in January 2012. This suggests that unconventional policies derive part of their effect by sending signals that bond market participants interpret to mean that the federal funds rate will remain at its zero bound longer than previously expected (see Christensen and Rudebusch 2012).



Consistent with these observations, Figure 4 also shows that the estimated median exit date from the near-zero federal funds rate moved forward significantly between the September and December 2013 FOMC meetings as market participants began anticipating the Fed's decision to scale back LSAPs. According to the model, in anticipating the decision to trim LSAPs, the market also thought the first federal funds rate hike might come sooner than previously anticipated. This latter change in expectations held even though the FOMC's projections of the appropriate future fed funds rate hardly changed from September to December. As of December 27, 2013, the median exit time for the market was estimated at one year and three months, which implies that the odds of keeping the near-zero interest rate policy past March 2015 are identical to the odds of exiting before that date.

## Conclusion

A novel model of the Treasury yield curve allows an assessment of investor expectations of the exit date from the Fed's near-zero interest rate policy. The results suggest that, as of the end of 2013, the expected exit date has moved forward notably since September 2013 despite only minor changes between September and December in FOMC participants' projections of appropriate future monetary policy. However, the estimated distribution of the probable exit date is skewed so that the likelihood of an earlier or later exit is sizable. This finding is consistent with the inherent uncertainty about the outlook for inflation and unemployment, the economic variables that guide FOMC rate decisions.

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