

## Conducting Monetary Policy when Interest Rates Are Near Zero

*Charles Carlstrom and Andrea Pescatori*

This *Economic Commentary* explains the concerns that are associated with the combination of deflation, low economic activity, and zero nominal interest rates and describes how monetary policy might be conducted in such a situation. We argue that avoiding expectations of deflation is key and that the monetary authority needs to demonstrate an unequivocal commitment to preventing deflation. We also argue that price-level targeting might be a good device for communicating such a commitment.

While business cycles are inevitable, there is quite broad agreement among economists and policymakers that monetary policy can and should be used to damp fluctuations in economic activity. But some fluctuations can occur in an unusual economic environment in which the traditional tools of monetary policy become useless. When short-term interest rates are at or near zero, for example, monetary policy cannot be implemented in the usual way—by adjusting these short-term interest rates. If policymakers want to lower rates in such an environment, they must look for alternative ways of conducting policy. With the federal funds rate hovering just above zero since December 2008, the current U.S. economic situation is a case in point. To conduct monetary policy under these conditions, the Federal Reserve has had to turn to a new strategy and new tools.

Some economists have pointed to another problem that an environment of near-zero interest rates could pose for monetary policy. They suggest that the inability to lower interest rates could allow a sudden and unexpected fall in the demand for goods and services to push the economy into a deflationary spiral, a situation in which falling prices and falling output feed upon each other. The fear is that a negative demand shock that pushes down prices (in short, a deflationary shock) could further decrease output, thereby accentuating the deflationary process. This additional deflation will then lead to further output decline. Paul Krugman, the economist and New York Times columnist, has dubbed this downward spiral a “black hole,” from where there is no return.<sup>1</sup>

This *Economic Commentary* explains the concerns that are associated with the combination of deflation, low economic activity, and zero nominal interest rates and describes some of the ways in which monetary policy might be conducted

in this situation. We conclude by emphasizing that to be effective in an environment of zero short-term nominal interest rates, monetary policy needs to be unequivocally committed to avoiding expectations of deflation. We also argue that price-level targeting might be a good device for communicating such a commitment. While this policy prescription follows from the assumption that the zero interest rate bound is a consequence of a negative demand shock hitting the economy, it is worth stressing that falling prices can also be the consequence of a supply shock, namely particularly high productivity growth (not a bad thing!). This would clearly call for different policy actions than the ones described here.

### **Zero Interest Rates and the Black Hole**

The special problem deflation might pose in times of near-zero nominal interest rates has to do with what could happen to real interest rates in such an environment and the effect that they could have on economic activity.

Consider, for example, a firm that decides to borrow money at a stated, or nominal, interest rate of 7 percent. If prices, including the firm’s product price, are expected to grow at 2 percent per year, then the real cost of borrowing for the firm (the real interest rate) is 5 percent per year. In principle, the real rate should be determined only by the saving and investment decisions of market participants, plus adjustments for risks, not monetary policy. In fact, a permanent change in expected inflation, say from 2 percent to 1 percent, will change only the nominal rate (in this case from 7 percent to 6 percent) and leave the real rate unchanged.

However, inflation expectations do not change instantaneously. Because they adjust over time, a policy move that decreases the nominal interest rate will also, in the short



run, temporarily decrease the real rate. The decrease in the real rate will increase the willingness of banks to lend and firms to borrow. This extra lending will then temporarily stimulate output. In this scenario, a central bank could easily counteract a deflationary shock that reduces prices and expected inflation (which could potentially raise the real rate temporarily and depress the economy) by lowering the real rate, or equivalently, by lowering the nominal rate by an amount greater than the fall in prices.

But if a deflationary shock occurs when nominal rates are already at or close to zero, policymakers cannot counteract the shock by further lowering the nominal interest rate. Even if long-term inflation is well moored, the deflationary shock may still lower short-term inflation expectations and therefore increase the real interest rate. The increase in the real rate may further depress investment, consumption, and aggregate demand, causing prices to fall further. This second bout of deflation will increase the real rate again and exacerbate the decline in output and the original deflationary shock.

It is important to stress that the extreme version of this scenario—the black hole Krugman refers to—is unlikely to occur, partly because firms anticipating a drop in demand will eventually cut production enough to stop excess supply. Nevertheless, our inability to offset a deflationary shock could conceivably prolong a period of deflation and falling output.

### Will Quantitative Easing Work?

Many argue that reserve targeting (or quantitative easing when it is done in a zero-interest-rate environment), can still stimulate the economy when short-term interest rates are zero. But if quantitative easing is implemented through the purchase of short-term securities, this policy is almost certainly doomed to failure.

Since banks' cash reserves and short-term securities are perfect substitutes when nominal interest rates are at zero, banks have no incentive to lend the money out. They are likely to simply substitute the cash they receive from the central bank for the securities they were holding in reserves. Therefore, the supply of money in circulation (that is, one common and useful definition of it, M1, which is currency held by the public plus demand and other checkable deposits) is not affected. To affect M1, banks need to lend the cash out to the private sector, which in turn will redeposit part of this cash into checking accounts, thereby increasing money in circulation. Because open market operations will not increase the money supply when short-term interest rates are zero, they can't be used to increase either real economic activity or prices.

But this reasoning applies to the purchase of short-term government securities. In March 2009, the Federal Reserve embarked on a program of quantitative easing by purchasing longer-term securities to stimulate the economy. Unlike short-term securities, these still had a positive rate of interest. The longer-term securities included agency mortgage-backed securities, agency debt, and longer-term government securities.

The idea behind buying longer-term government securities is that doing so will drive up their demand and therefore the price of these securities. This will decrease their yield and therefore lower long-term interest rates. Lower long-term interest rates will end up stimulating investment and the economy. The assumption underlying this approach is that banks will not simply sit on the cash they receive from the Fed in exchange for the long-term securities, and the supply of money in circulation will actually rise in consequence. That is, banks cannot view long-term and short-term government securities as perfect substitutes. Otherwise, they will not attempt to buy other long-term securities or loan out this extra cash.

While evidence suggests that longer-term interest rates fell with the announcement that the Fed would purchase long-term securities, the challenge for this policy is to have a large and lasting impact. That impact rests on a couple of assumptions, one of which is that the markets for short- and long-term bonds are segmented from each other; that is, short-term and long-term securities are not good substitutes for one another. With segmented markets, the supply and demand schedules for loanable funds in each market are separate.

But even if markets are segmented, over time, traders will be “tempted out of their preferred market segment” by the lure of higher expected returns. By decreasing long-term rates, the risk-adjusted return for short-term treasuries increases. Long-term interest rates will start to increase as investors substitute away from long-term securities to short-term securities, or equivalently, zero-interest-earning excess reserves. The extra money pumped into the system by long-term security purchases may quickly wind up back in banks' reserve accounts.

Another way to think about this is that eventually long-term interest rates are eventually determined by market fundamentals, namely long-term inflation expectations in conjunction with expected long-term economic growth. Long-run growth is driven by nonmonetary factors.

Even while purchases of long-term treasuries may be affecting long-term interest rates, it is not easy to assess the size of the purchase that is required to affect yields in the desired manner or the timing of those effects.

In terms of sheer numbers, quantitative easing was dominated by purchases of mortgage backed securities (MBS) and not long-term government securities after interest rates effectively hit zero. The idea behind purchasing MBS is that the real impact of the operation will be much larger. This is because MBS are nowhere near as closely substitutable with short-term securities as government-issued long-term securities are, which implies that the market segmentation between short-term government securities and private MBS will persist for a much longer period of time. The evidence does suggest that these purchases have been successful in lowering mortgage rates.

## Communication as a Policy Tool

As we have seen, when short-term rates are zero, monetary policymakers must look beyond standard tools to influence inflation and output. But they have another tool not yet mentioned. The FOMC can communicate, usually through speeches and its policy statements, information that is meant to influence expectations about future changes in the federal funds rate. Expectations of future monetary policy can increase future money growth and hence expected inflation. Increased inflationary expectations will lower real interest rates. This is one way of understanding the FOMC's current language that there are likely to be "exceptionally low levels of the federal funds rate for an extended period."

We have discussed the importance of expected inflation in counteracting a deflationary spiral. If interest rates are at zero, increases in expected inflation will decrease today's real interest rate, stimulating both the real economy and prices. Using communication to boost future inflation expectations in this environment requires policymakers to promise that they will "err" on the side of keeping interest rates low even after the economy starts to recover. In essence, this future inflation will stimulate the economy today and actually increase money today.

Perhaps the best way for the central bank to communicate that it plans to deliver on its promise to "err" on the side of future inflation whenever deflationary shocks hit is to develop a simple rule that the public can easily monitor to see whether the central bank is fulfilling its promise. One simple rule is a price-level target. With a price-level target, the central bank commits to sticking to a given path for the level of prices over some horizon. If prices start rising faster than a prespecified rate, policymakers must lower inflation in the future to get the price level back to the target. Similarly, if there is a deflationary shock, the central bank must inflate in the future because it has to bring the price level back up (see figure 1).

Instead of a price-level target, many central banks around the world have adopted inflation targeting, where inflation over a period of around two years is on average kept constant. A credible inflation target will anchor inflation expectations over the specified horizon, which, by definition, is enough to avoid expected deflations and increases in the real rate.

However, there is an important difference between an inflation target and a price-level target. An inflation target "lets bygones be bygones," while a price-level target corrects for past misses. If prices fall on a year-over-year basis, a price-level target requires the central bank to reflate prices until they are back to the target. An inflation target requires only that the rate of inflation be returned to its target rate from the present onward.

A price-level target is essentially a promise that a deflationary shock today will increase inflation in the future and thus expected inflation today. This promise of future inflation will lower real interest rates even when short-term nominal rates are zero. Long-term inflation is still pinned down as it

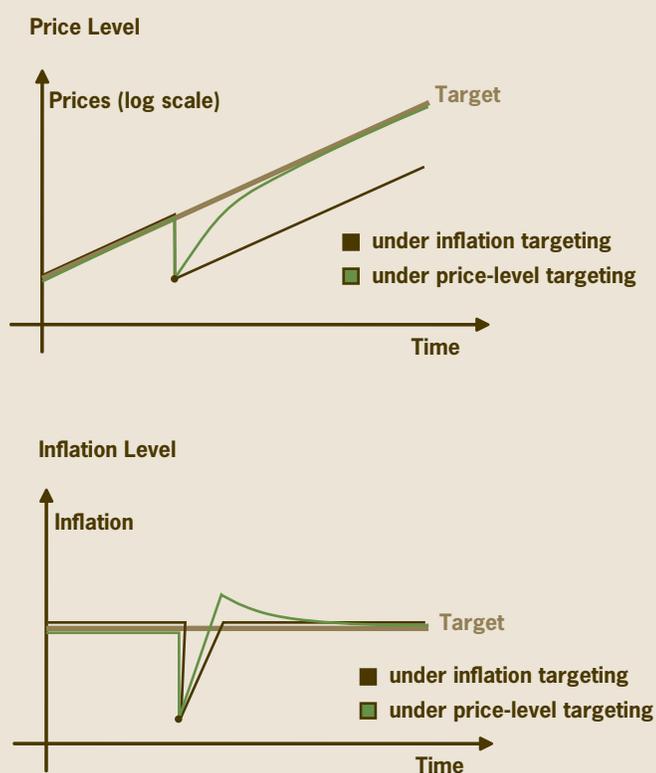
is with an inflation target. One of the rare positive elements of the recent period of turmoil has been the stability of any measure of inflation expectations (survey or market-based), especially at medium and long horizons. It is an open question whether a central bank targeting the price level would have the same credibility, so that long-term inflation expectations remained well-anchored.

One drawback of a price-level target is that it necessitates stimulating the economy whenever prices fall—no matter what the cause. For example, an expansion driven by a positive supply shock would naturally put downward pressure on prices and upward pressure on the real rate, but few economists believe that monetary policy accommodation is helpful in such a situation. An inflation target can potentially be changed, to respond to unusual economic conditions, but a price-level target has the advantage of responding according to a very simple and easy-to-understand rule.

## Avoiding the Zero Lower Bound

Going forward, it is important to try and minimize the chances that short-term interest rates will hit zero in the future. One way of doing this is for the Fed to increase its implicit long-term inflation target. Instead of the 1.5 percent–2 percent range for long-term inflation that most market participants currently expect the Fed to pursue, John Williams of the San Francisco Fed argues that the Fed's long-term inflation target may have to be increased to the 2 percent–4 percent range. This will increase the long-term federal funds rate, thereby giving the Fed extra "ammunition" before the zero lower bound sets in.

### 1. Inflation and Price-Level Responses to Different Targeting Regimes



But instead of a higher long-term inflation target, a price-level target is another way to mitigate the chances that a zero lower interest rate bound will be hit in the future. (Recall that a price-level target still implies a given long-term inflation rate.) If the economy is hit by a major deflationary shock when nominal rates are close to zero, a price-level target has a clear advantage over an inflation target. If monetary policy aims at stabilizing prices, policymakers must create future short- to medium-term inflation to correct for past misses. The future inflation promised by a price-level target will increase expected inflation over the short- to medium-term and therefore increase nominal rates, helping to insure that the zero lower bound for interest rates is never reached.

Undeniably, the zero bound produces problems for monetary policy, but these problems are not insurmountable. Communicating future monetary policy is the best way for monetary policymakers to increase inflation expectations when short-term interest rates are constrained by a zero lower bound. Furthermore, a price-level target is something that can potentially be used to enhance this communication. An appropriate price-level target can also reduce the likelihood of ever hitting the zero bound to begin with.

## Footnotes

1. Although we focus on deflation, we recognize that some people are concerned about inflation risk in the economy as well. Our focus on deflation is not intended to express a view on the likelihood of one outcome as being greater than another.

## Recommended Readings

“Japanese Monetary Policy: A Case of Self-Induced Paralysis?” by Ben Bernanke. 2000. In *Japan’s Financial Crisis and its Parallels to U.S. Experience*, Institute for International Economics, special report no. 13, edited by R. Mikitani and A. Posen.

“It’s Baaack! Japan’s Slump and the Return of the Liquidity Trap,” by Paul Krugman. 1998. *Brookings Papers on Economic Activity*, vol. 2, edited by W. Brainard and G. Perry.

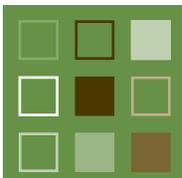
“Crisis in Prices,” by Paul Krugman, 2002. *New York Times*.

“Heeding Daedalus: Optimal Inflation and the Zero Lower Bound,” by John C. Williams. 2009. Forthcoming in *Brookings Papers on Economic Activity*.

“The Zero Bound on Interest Rates and Optimal Monetary Policy,” by Gauti Eggertsson and Michael Woodford. 2003. *Brookings Papers on Economic Activity*, vol. 1, edited by W. Brainard.

Charles T. Carlstrom is a senior economic advisor at the Federal Reserve Bank of Cleveland, and Andrea Pescatori is a research economist at the bank. The views they express here are theirs and not necessarily those of the Federal Reserve Bank of Cleveland or the Board of Governors of the Federal Reserve System or its staff.

*Economic Commentary* is published by the Research Department of the Federal Reserve Bank of Cleveland. To receive copies or be placed on the mailing list, e-mail your request to [4d.subscriptions@clev.frb.org](mailto:4d.subscriptions@clev.frb.org) or fax it to 216.579.3050. *Economic Commentary* is also available on the Cleveland Fed’s Web site at [www.clevelandfed.org/research](http://www.clevelandfed.org/research).



Return Service Requested:  
Please send corrected mailing label to the  
above address.  
Material may be reprinted if the source is  
credited. Please send copies of reprinted  
material to the editor at the address above.

Federal Reserve Bank of Cleveland  
Research Department  
P.O. Box 6387  
Cleveland, OH 44101

PRSR STD  
U.S. Postage Paid  
Cleveland, OH  
Permit No. 385