



## Monetary Policy in a World with Interest on Reserves

*Charles T. Carlstrom and Timothy S. Fuerst*

Banks have long been required to hold reserves equal to a percentage of their net transactions accounts (checkable deposits, for example), but until recently, they earned no interest on those reserves. The Fed now pays interest on required and excess reserve balances, having been granted the authority by Congress and putting the policy into place ahead of schedule so that it could be used to help address the financial crisis. The policy will be particularly useful when it's time to start tightening policy and unwind the Fed's balance sheet.

The Federal Reserve has long advocated for the authority to pay interest on banks' excess and required reserve balances. For example, in March of 2001, Board Governor Lawrence Meyer argued that financial innovation had pushed bank reserves to such low levels that greater funds rate volatility might result. To push reserves back up to higher levels, Meyer advocated paying interest on reserves (hereafter, IOR). Many argued that IOR would make it easier to hit the federal funds rate target, and changes in the IOR rate could also be an additional policy tool.

Congress granted the authority to pay IOR in 2006, and the new policy was set to begin in 2011. This start date was accelerated, however, when Congress authorized the Federal Reserve Board to put the policy into effect in October 2008, during the heart of the financial crisis. According to the press release announcing the change, paying IOR was intended to help keep the fed funds rate close to its target, but it was also expected to "give the Federal Reserve greater scope to use its lending programs to address conditions in credit markets..." Chairman Bernanke subsequently clarified that the policy would also allow the Fed to change the funds rate independent of changes in its balance sheet. (testimony to Committee on Financial Services, U.S. House of Representatives, February 10, 2010).

In this *Commentary*, we review the effects of the new IOR policy. We argue that it clearly allows for easier unwinding of the unprecedented expansion the Fed's balance sheet. We also argue that it will be useful as a policy tool going forward because the vast quantity of excess reserves that exists now has impaired the liquidity of the funds market.

### **Bank Reserves and the Federal Funds Market**

Banks are required to hold reserves (vault cash and deposits at the Fed) equal to a fraction of their net transactions accounts, which are largely demand deposits. On any given day, some banks will find themselves with more reserves than they are

required to hold, while other banks might find themselves in the opposite situation. Banks with excess reserves (ER) will lend these out in the federal funds market. The rate charged on these short-term loans is called the federal funds rate.

Historically, banks held very few excess reserves (less than \$1 billion) because the Fed did not pay interest on these reserves, and banks could earn more by lending them out. But when the federal funds rate effectively hit zero in December 2008, the opportunity cost of holding ER was eliminated (that is, banks lost nothing by holding onto ER because they could earn nothing by lending them out). This, along with the increased demand for liquidity, led banks to start accumulating excess reserves, which rose to over \$800 billion by the end of 2008. The expanded supply of reserves was a result of the Fed extending large amounts of credit through various facilities, which were not offset by equivalent sales of Treasury securities

The demand for bank reserves comes from the requirement to hold reserves along with banks' desire to have some ER on hand to cover withdrawals. Given banks' demand, the Fed can achieve any desired target for the federal funds rate by altering the supply of reserves. But since the Fed cannot perfectly anticipate all fluctuations in banks' demand for reserves, the actual federal funds rate may fluctuate around the announced target rate set by the FOMC. (See figure 1.) During normal times, these funds rate "misses" are typically small and short-lived (usually one to two days) because the Fed can adjust the supply of reserves to move the rate back to the target.

But during the financial turmoil throughout 2008 these misses became larger. There was a huge flight to liquidity during the period, which manifested itself in an increased desire to hold extremely liquid Treasury bills and ER. The surge of excess reserves available in the market was difficult to forecast, implying that it became more difficult to hit the funds rate target.

## Interest on Reserves Helps Fed Hit Target

This episode highlights the fact that there are periods in which the Fed might find it useful to have some assistance in hitting its interest rate target. Figure 2 demonstrates how the IOR policy can provide such assistance.

Banks' demand for reserves is downward-sloping because at lower interest rates there is a smaller opportunity cost to holding reserves. That is, as the foregone interest income from holding ER declines, banks will demand more reserves. This decline is interrupted at the IOR rate because banks would never lend reserves at a rate below the IOR rate. The absence of a lender at below-IOR rates implies that the IOR regime would create an effective floor in the funds rate, preventing the funds rate from falling below the IOR rate. For symmetric reasons, the primary credit rate (the rate at which the Fed will lend to banks) implies an effective ceiling on the funds rate, so that together the IOR rate and the primary credit rate create a corridor in which the funds rate would trade. The corridor minimizes the chances for deviations (misses) between the actual and target fed funds rates.

Curiously, even after the IOR regime began, the funds rate has been slightly below the interest rate offered on excess reserves. This anomalous behavior is apparently a result of the fact that nonbanks (such as government-sponsored enterprises) hold deposits at the Fed but do not earn interest on the reserve balances they hold. These nonbank institutions are lending in the fed funds market at rates below the interest rate on excess reserves. Banks could presumably borrow at the funds rate, hold the reserves, and make a profit. Why banks do not engage in such behavior is unclear. Potential explanations include concerns about bank capital ratios and concerns that borrowing large amounts in the overnight funds market could be seen as a sign of liquidity problems.

In figure 2, note that as the funds rate falls toward the IOR rate, reserve demand flattens. This flattening occurs because as the fed funds target—and presumably, other money market

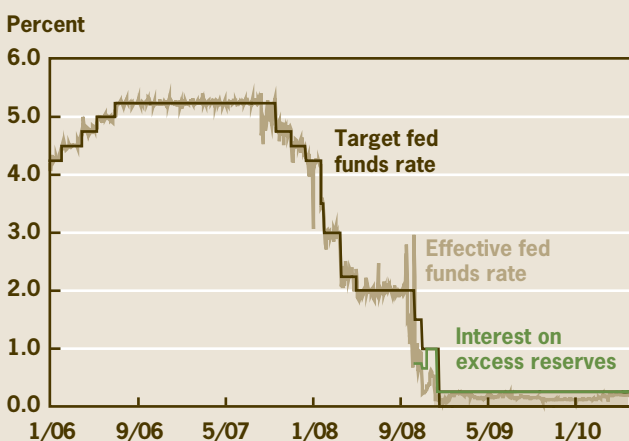
rates—gets closer to the IOR rate, banks become indifferent about holding large quantities of excess reserves. With no better interest-earning alternative for these funds, banks will hold an unlimited amount. Their demand curve becomes perfectly flat. In this special case, even unexpected increases in reserve demand (as happened during the fall of 2008) would not force the actual funds rate up above the target because banks could easily accommodate this demand out of their excess reserves. Under such a scenario, one would also anticipate fewer misses of the funds rate target.

In the more likely scenario, the funds rate will be somewhat above the IOR rate, as shown in figure 2. In this case, increases in reserve demand (labeled “high reserve demand” in figure 2) will result in modest deviations between the actual and target federal funds rates. Note that the same outcome will not occur if the funds rate target is significantly above the IOR rate.

Thus, one clear advantage of IOR is to improve the ability of the Fed to hit its funds rate target on a day-to-day basis. A decline in funds rate volatility is beneficial, as it lowers the uncertainty for market participants. But there is a “catch 22.” With IOR set at or near the funds rate, banks will hold large amounts of ER. As a result, they will have less need to borrow and lend in the federal funds market to meet day-to-day needs, so that the fed funds market could become less liquid. This illiquidity makes managing a funds rate target more problematic.

Because of this potential illiquidity, the Chairman has testified that the “federal funds rate could for a time become a less reliable indicator than usual of conditions in short-term money markets. ... In particular, it is possible that the Federal Reserve could for a time use the interest rate paid on reserves, in combination with targets for reserve quantities, as a guide to its policy stance.” That is, even if the Fed does not target the fed funds rate, the IOR rate will still act as a floor on the funds rate, and increasing the IOR rate will also increase the funds rate and thus tighten monetary policy.

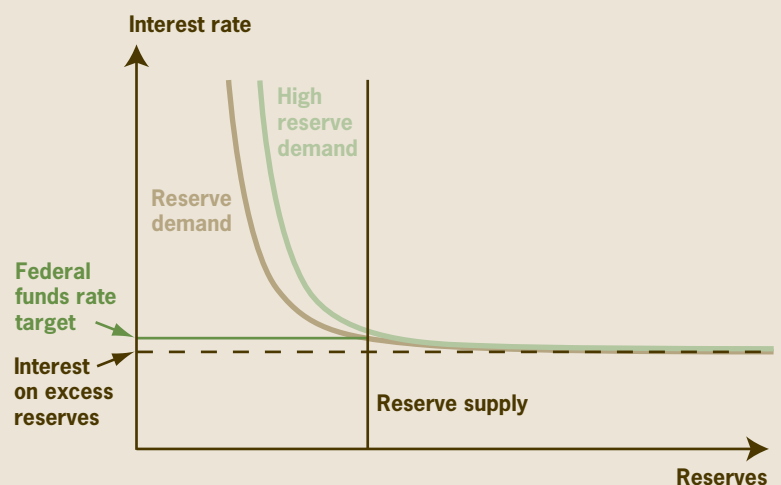
Figure 1. Effective and Target Federal Funds Rate



Note: Shaded area represents a target range of the funds rate from 0 percent to 0.25 percent.

Source: Federal Reserve Board.

Figure 2. The Market for Bank Reserves



## A New Policy Tool Going Forward?

As the economy recovers and the funds rate moves above zero, one area of concern is that the Fed's large balance sheet may lead to increases in the money supply and thus stoke inflation. IOR, along with term deposits and reverse repos, is a means of avoiding this problem. Without these tools, if the Fed increased the funds rate from 0 percent to 1 percent, banks would quickly lend out their non-interest-earning ER in the federal funds market. All of these ER flowing into the market would put downward pressure on the funds rate, making it very difficult for the Fed to achieve its target. Without these tools, to achieve the target (and avoid a substantial increase in the money supply) the Fed would have to start selling securities to soak up the ER being shed by banks. There is potentially a lot to soak up. ER are currently on the order of \$1,100 billion. Given this large size and the fact that much of the balance sheet is in mortgage-backed securities (MBS) and long-term government securities, this could be quite disruptive to financial markets.

IOR is one tool the Fed can use to alleviate this problem. Paying IOR can potentially eliminate the desire of banks to rapidly shed ER when the funds rate is moved above zero (assuming that the IOR rate moves in tandem with the funds rate target). Similarly, in his February 10, 2010, testimony before the House Committee on Financial Services, Chairman Bernanke explained how reverse repos and interest-bearing term deposits are also important tools to help manage reserve levels while the balance sheet is still large. Another option is for the Federal Reserve to sell assets from the portfolio, which the FOMC discussed at its April 27–28, 2010, meeting. No decision was made at this meeting, but the minutes noted that most participants “preferred that the agency debt and MBS held in the portfolio be sold at a gradual pace that would complete the sales about five years after they began.” This suggests an important role for IOR for at least the next few years.

In the long run, how will monetary policy be different in an IOR world? By expanding the level of ER, does IOR create an additional policy tool? To answer these questions it is first helpful to recall how policy was implemented before IOR. Keep in mind that to affect real output and prices the Fed must change the supply of money available to the public (that is, the sum of currency in circulation and checkable deposits).

In the past, if the Fed wanted to inject reserves into the banking system, it undertook an open market purchase of T-bills from banks. This expansion of the supply of reserves would push down the funds rate. Further, with no IOR, banks would typically lend these new reserves out to earn interest. The funds lent out would eventually be redeposited in the banking system, and this increased lending would increase the money supply, as these loans are lent out again.

But under a regime where the IOR rate is set equal to the funds rate target, a Fed purchase of T-bills has no effect on the amount of money in circulation. If banks earn the same

interest rate on ER and T-bills, they have no incentive to lend out the ER that they receive from selling their Treasury bills to the Fed. Instead, banks are likely to simply take these funds and hold them as ER. Hence, this increased supply of reserves will have no effect on the funds rate. These reserves will also never make it into circulation nor have an impact on prices or economic activity, suggesting that these reserves have no power as an additional policy tool.

While open market operations alone would have no effect, changes in the funds rate should have the same effect on the money supply and impact on real economic activity as they always did. The only difference is in the potential behavior of the Fed. With no IOR, the Fed must buy T-bills in order to lower the funds rate. In contrast, when the Fed pays IOR, a change in the funds rate target would be accompanied by a change in the IOR rate. To implement the new target, the Fed's open market desk need not (but still could) purchase T-bills in order to support its funds rate target. If they purchased T-bills, everything works as above and banks will continue to hold the same amount of ER as before. But if the desk decided not to purchase T-bills, banks can purchase these same T-bills using their ER instead. The shedding of reserves by banks boosts the money supply in the same way that an open market operation would.

As shown in figure 2, when the spread between the funds rate and the IOR rate is zero, the Fed can expand the level of reserves without changing either the funds rate or the IOR rate. Indeed this is the reason that IOR can help in unwinding the balance sheet. But the ability to control both the funds rate and a particular level of reserves is the reason that some economists including Marvin Goodfriend have argued that IOR could give the Fed a new policy tool, supplementing its federal funds and discount rate tools.

This is in effect what the Fed started doing in March 2009, when it embarked on a program of credit easing by purchasing longer-term securities. These longer-term securities included agency MBS, agency debt, and longer-term government securities. The reason for buying these assets at that time was that the funds rate was already zero and could not be lowered further. The hope was that by buying longer-term government securities (which still had a positive rate of interest), the Fed could drive up the price of long-term securities and hence decrease their yield, or interest rate, flattening the yield curve.

IOR thus allows the level of reserves to be set independently of the targeted funds rate. But does the level of reserves matter? Reserves are created by the Fed's purchase of financial assets. Historically, these purchases have largely been shorter-term Treasury securities (often with repurchase agreements). Reserves created through these purchases of short-term Treasuries would not represent a separate policy tool because of their close substitutability with ER.

However, other purchases, such as the recent Fed purchase of MBS, are a different matter in that these are not close substi-



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

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

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.



Charles T. Carlstrom is a senior economic advisor at the Federal Reserve Bank of Cleveland, and Timothy S. Fuerst is a senior economic advisor 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).

tutes for ER. In an earlier *Economic Commentary* (October 2009), Carlstrom and Pescatori argued that the effect of purchasing long-term Treasury securities is likely to be modest and potentially short-lived, although the purchase of MBS may be more effective. But these MBS purchases have been extraordinary measures. Additional purchases have been discontinued and are not likely to take place in normal times.

### **The Benefits of IOR**

During normal times, the macroeconomic benefits of paying IOR are limited to a technical improvement for implementing monetary policy. However, the advantages are likely to be small, because it is neither a lot easier nor harder to achieve our macroeconomic policies if we pay or do not pay IOR. On the other hand, it would be a mistake to say that the benefits of paying IOR are small. We all own fire extinguishers despite the fact that on a daily basis we do not use them. Similarly, the principal advantage of paying IOR is having the tool available to respond to future crises. Further, paying IOR is clearly advantageous in the current environment. In particular, it will make it much easier for the Fed to unwind the expansion of its balance sheet. It may also be the

current policy tool of choice, given decreased trading in the funds market owing to elevated quantities of ER.

There are other advantages to paying IOR. First, there are small tax advantages to paying interest on required reserves. With no IOR, one reason lending rates are greater than deposit rates is because a fraction of deposits cannot be loaned out but must be held as non-interest-bearing required reserves. This is an implicit tax on intermediation. The elimination of the reserve requirement tax will tend to drive the deposit rate and loan rate closer together and increase intermediation. This effect is likely quite modest as only a small fraction of bank deposits are reservable. Second, paying IOR will allow banks to lower costs. When the Fed did not pay IOR, banks spent resources to regularly “sweep away” ER into some interest-earning investment. These ER were ultimately held by someone, so all of this bank behavior was socially wasteful. But with IOR, these activities will no longer be necessary, and banks can economize on these costs. Third, IOR will lower the day-to-day volatility of the funds rate target, making it easier for banks and other market participants to manage their portfolios. This could lead to a more efficient system of monetary policy implementation.