

Economic Brief

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The Effect of Interest on Reserves on Monetary Policy

By John R. Walter and Renee Courtois

In October 2008 the Federal Reserve began paying banks interest on the reserves they hold. This action was intended to remove the implicit, distortionary tax that reserve requirements impose on banks, as well as help the Fed maintain the fed funds rate at its target. Going forward, interest on reserves is likely to simplify monetary policy implementation, as well as allow the Fed to pursue separate monetary and credit policies.

On October 13, 2006, the Federal Reserve was granted authority by Congress to begin paying banks interest on the reserves they hold (IOR), with implementation scheduled for October 1, 2011. The Emergency Economic Stabilization Act of 2008 accelerated implementation, at the Fed's request, to October 1, 2008. Under the authority granted by the Act, the Fed amended its Regulation D (Reserve Requirements of Depository Institutions) to mandate that regional Federal Reserve Banks pay interest to depository institutions on both their required and excess reserves.

Many economists have long supported the establishment of an IOR regime. Milton Friedman advocated the idea more than 40 years ago, and many central banks today employ some form of the policy. Implementation of IOR achieved many of the outcomes economists anticipated, and will likely abet and simplify the Fed's implementation of monetary policy in the future.

HISTORY OF INTEREST ON RESERVES

IOR affects banks' incentives to hold both required and excess reserves. Paying interest on required reserves avoids the implicit tax that reserve requirements impose on banks, which is equal to the income banks could have earned by using those funds for profit-generating loans and investments. Like many taxes, this is distortionary. Because reserve requirements often exceed the amount of cash banks require to settle daily business transactions, in the absence of IOR banks will expend valuable resources moving their customers' deposits into "sweep" accounts (accounts, like money market accounts, that are not subject to reserve requirements) at the end of each business day. Under IOR, banks can devote those resources to more productive ventures.

Beyond eliminating a distortionary tax, paying interest on excess reserves is intended to help the Fed achieve its target federal funds rate, and therefore its influence over other market interest rates. This task had become more difficult once the Fed began providing liquidity to financial markets through new lending facilities first launched in late 2007 to ease dislocations in credit markets. To see why IOR helps the Fed achieve its target fed funds rate, it is helpful to review the mechanism for monetary policy implementation.

The Fed, like many central banks, conducts monetary policy through daily interventions in the market for bank reserves.¹ In so doing, the Fed aims to achieve the target federal funds rate by adjusting the supply of bank reserves to intersect banks' demand for reserves at the level at which the market-clearing fed funds rate will be equal to the target rate. To accomplish this, the Fed must on a daily basis estimate banks' demand for reserves, and adjust supply accordingly.

Banks' demand for reserves is variable because the amount of deposits they hold is constantly changing through the course of daily business. In the absence of IOR, banks choose to hold reserves based on reserve requirements set by the Fed (zero to 10 percent of deposits in most cases) and the payments they expect to make to other banks and financial market participants through the course of daily business, as well as the costs associated with having insufficient reserves should they fall below the required amount over the relevant review period. Those costs include the price of borrowing funds on the federal funds market, through the Fed's discount window, and through daylight credit extended by the Fed (the penalty fee charged for daylight credit resembles an overdraft charge, applied daily according to banks' balances in accounts held at the Fed).²

If banks are not paid interest on reserves, as was the case prior to October 2008, they will wish to minimize their holdings of excess reserves, which earn no income. Instead banks will make loans or transfer them into other holdings, such as bonds. In other words, IOR reduces banks' opportunity cost of holding reserves, which will, all else equal, make them more willing to hold excess reserves.

This feature became important once the Fed began injecting liquidity into financial markets starting in December 2007 to ease credit conditions. In making these injections, the Fed created money to extend loans to financial institutions. Those institutions provided as collateral securities from their portfolio that had, as a result of the financial market turmoil, become difficult to trade and value. This action essentially replaced illiquid assets in their portfolio with a credit to their account at the Fed, which would add reserves to the banking system. Adding reserves to the system will, under usual circumstances, exert downward pressure on the fed funds rate. At the time the Fed was not yet facing the zero-lower-bound on interest rates that it faces today. Thus, the injections had the potential to push the fed funds rate below its target, increasing the overall supply of credit to the economy beyond a level consistent with the Fed's macroeconomic policy goals, particularly concerning price stability.

To avoid this outcome, the Fed "sterilized" the effect of liquidity injections on the overall economy: It sold an equal amount in

Treasury securities from its own account to banks. Sterilization offset the injections' effect on the monetary base and therefore the overall supply of credit, keeping the total supply of reserves largely unchanged and the fed funds rate at its target. Sterilization reduced the amount in Treasury securities that the Fed held on its balance sheet by roughly 40 percent in a year's time, from over \$790 billion in July 2007 to just under \$480 billion by June 2008. However, following the failure of Lehman Brothers and the rescue of American International Group in September 2008, credit market dislocations intensified and lending through the Fed's new lending facilities ballooned. The Fed no longer held enough Treasury securities to sterilize the lending.

This led the Fed to request authority to accelerate implementation of the IOR policy that had been approved in 2006. Once banks began earning interest on the excess reserves they held, they would be more willing to hold on to excess reserves instead of attempting to purge them from their balance sheets via loans made in the fed funds market, which would drive the fed funds rate below the Fed's target for that rate. When the Fed stopped sterilizing its liquidity injections, the monetary base (which is comprised of total reserves in the banking system plus currency in circulation) ballooned in line with Fed lending, from about \$847 billion in August 2008 to almost \$2 trillion by October 2009. However, this did not result in a proportional increase in the overall money supply (Figure 1). This result is likely due largely to an undesirable lending environment: Banks likely found it more desirable to hold excess reserves in their accounts at the Fed, earning the IOR rate with zero risk, given that there were few attractive lending opportunities. That the liquidity injections did not result in a proportional increase in the money supply may also be due to banks' increased demand to hold liquid reserves (as opposed to individually lending those excess reserves out) in the wake of the financial crisis.

ANTICIPATED AND ACTUAL EFFECTS OF IOR

A number of outcomes were expected from implementation of IOR. First was the expectation that banks would be more willing to hold reserves – that is, they would abandon "sweep" programs that reduce their level of required reserves. In fact, required reserves increased fairly significantly after the Fed began to pay interest on required (as well as excess) reserves, from \$42.5 billion in September 2008 to \$62 billion in October 2009 (see Figure 2, though this increase is not obvious due to the scale of the figure).

As can be seen in Figure 2, total reserves grew significantly, due almost entirely to growth in excess reserves (the difference between total and required reserves). This has mistakenly been viewed by

some as a sign that the Fed's lending facilities — the goal of which has been to maintain the flow of credit between banks, and therefore from the banking sector to firms and households — have not worked. To the contrary, the level of reserves in the banking system is almost entirely unaffected by bank lending. By virtue of simple accounting, transactions by one bank that reduce the amount of reserves it holds will necessarily be met with an equal increase in reserves held at other banks, and vice versa. As described in detail in a 2009 paper by New York Fed economists Todd Keister and James McAndrews, nearly all of the total quantity of reserves in the banking system is determined solely by the amount provided by Federal Reserve.³ Thus, the level of total reserves in the banking system is not an appropriate metric for the success of the Fed's lending programs.

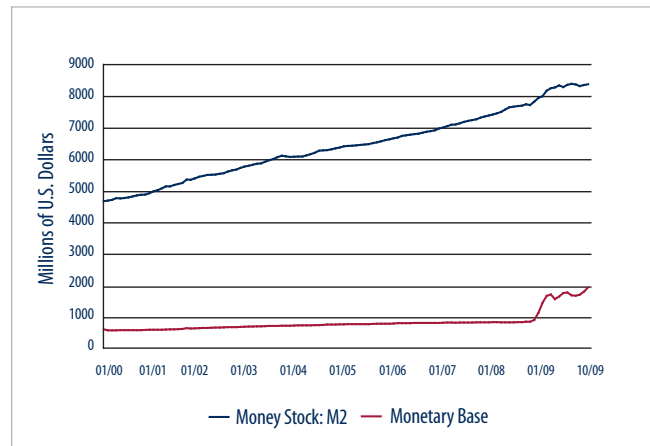
The second effect expected by IOR was that it would help the Fed be more successful at achieving the fed funds target. This is because the IOR rate was expected to impose a floor on the fed funds market. If the IOR rate is set at one percent, for example, no bank would lend funds on the fed funds market for less than one percent since they could earn more by simply holding those funds as excess reserves.

Despite this logic, the fed funds rate did trade below the Fed's target after IOR was implemented. One likely reason is that some financial institutions (like Government Sponsored Enterprises and some international institutions) hold reserves with the Fed but are not eligible to earn interest on reserves. Unlike banks receiving IOR, these entities would not be content to hold excess reserves. In order to find willing borrowers on the overnight market, these entities would have to undercut the fed funds rate. Borrowers of those funds might include banks looking to earn a profit on the spread between the interest rate they pay to borrow funds from institutions not eligible for IOR and the rate that could be earned by making additional loans or simply holding excess reserves at the IOR rate. Lending on the overnight market by these institutions which are not eligible for IOR likely pushed the effective fed funds rate below its target (Figure 3).

Though IOR was not initially successful at creating a floor on the fed funds rate, it is difficult to know whether this situation would have persisted since the Fed soon reduced its target fed funds rate close to its lowest possible level. As of December 16, 2008, the fed funds target was established as a range from zero to twenty-five basis points. Obviously, the zero bound does not provide scope for analyzing whether the fed funds rate is trading below its target since nominal interest rates cannot fall below zero.

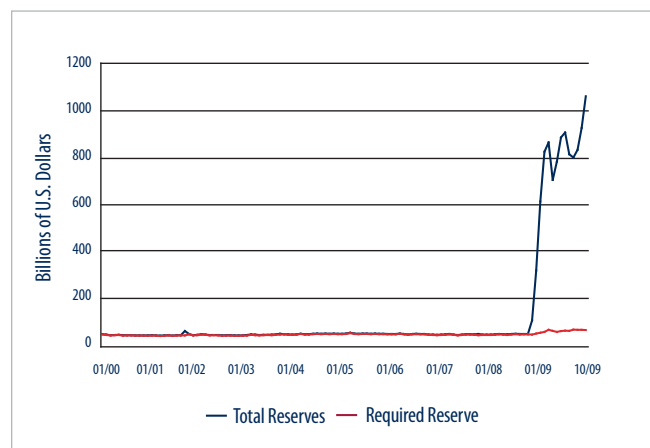
Finally, IOR policy will reduce, all else equal, the amount that the Fed turns over to Treasury at the end of each fiscal year. Each year

FIGURE 1: MONEY STOCK (M2) AND MONETARY BASE



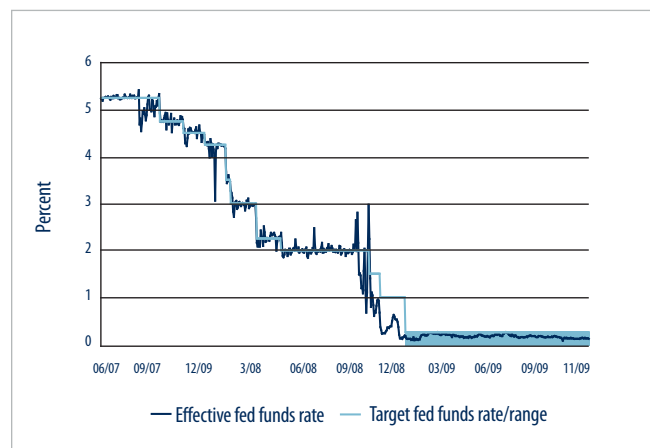
SOURCE: Board of Governors of the Federal Reserve System

FIGURE 2: REQUIRED AND TOTAL RESERVES IN THE BANKING SYSTEM



SOURCE: Board of Governors of the Federal Reserve System

FIGURE 3: TARGET AND EFFECTIVE FED FUNDS RATE



SOURCE: Federal Reserve Bank of New York

NOTE: The interest rates paid to banks for holding excess and required reserves are close to the fed funds target rate and therefore are not shown in the above chart. For IOR rate data, refer to the official Web site of the Board of Governors of the Federal Reserve System: <http://www.federalreserve.gov/monetarypolicy/reqresbalances.htm>

the Fed sends the full amount of its income that is not used to fund operations back to Treasury. Indeed, the payments to Treasury equaled about \$34.6 billion in 2007, falling to \$31.7 billion in 2008 (a decrease of about \$2.9 billion). However, the Fed paid just over \$816 million to banks in interest on reserves during the three months it was operational in 2008, so less than a third of this decrease is directly due to IOR. Additionally, the expansion of the Fed's balance sheet means that while it is earning a smaller net interest margin because of interest on reserve, it is earning it on a much larger base of assets, mitigating the fiscal impact of IOR.

IMPLICATIONS FOR FUTURE MONETARY POLICY

Economic recovery could bring increasingly profitable opportunities for banks to lend excess reserves instead of holding them. This would likely lead to growth in the money supply and credit, which could ultimately be inflationary. Therefore, as the economy recovers and credit conditions ease, the Fed may wish to wind down its liquidity programs. That is, it may wish to remove assets from its balance sheet that it acquired from financial institutions through its lending facilities, thereby removing some of the excess reserves from the banking system.

To an extent, excess reserves will wind down naturally as demand for the Fed's lending programs decreases with improvement in financial and economic conditions, and this has already begun. That notwithstanding, the Fed has two options for mitigating the effect of excess reserves on the macroeconomy. First, the Fed can soak up some of the excess reserves in the banking system. As detailed in October 2009 remarks by Federal Reserve Board Chairman Ben Bernanke, options for doing so may entail a sale of assets by the Fed to financial market participants – including banks, GSEs, and other institutions – that drains reserves as the proceeds of each sale are withdrawn from the banking system.⁴ These means of withdrawing excess reserves could tighten monetary policy by putting upward pressure on short-term interest rates and thus limiting the growth of broad measures of money and credit.

Second, the Fed can raise the IOR rate, reducing the degree to which banks will wish to lend excess reserves to the public. Banks will be unwilling to make loans to the public at a rate lower than what they can earn from the Fed for holding excess reserves, so the IOR rate can be used to affect the supply of money and credit to the economy. This leads to a broader point about how IOR changes monetary policy implementation: Under an IOR regime, short-term interest rates and, ultimately, economic growth and inflationary pressures are determined most importantly by the IOR rate. As described above, the IOR rate should act as a floor on the fed funds rate. Former Richmond Fed economist Marvin Goodfriend and others have

argued it can also be used indirectly to create a ceiling.⁵ As long as the Fed floods the fed funds market with enough reserves to keep the supply of reserves above banks' demand for reserves, the market fed funds rate will not be bid above the Fed's target. This could simplify monetary policy implementation by avoiding the need for the Fed to estimate reserve demand daily. Experience from foreign central banks suggests IOR can be an effective way for the Fed to manage short-term interest rates. The fact that fed funds have traded persistently below the IOR rate might create some uncertainty over the likelihood of this outcome. But trading below IOR has largely been due to the behavior of nonbank institutions, which cannot earn interest on reserves. A rising IOR rate will ultimately be directly relevant to the portfolio decisions of banks, since no bank will lend to the public below that rate, and therefore to the spending decisions of households and businesses.

Importantly, paying interest on reserves allows the Fed to address tightness in credit markets independently from macroeconomic conditions, and vice versa, leaving the Fed free to pursue separate monetary and credit policies. For example, the Fed could hypothetically begin to raise the target federal funds rate in line with a strengthening economy, while continuing its lending facilities to address any remaining strains in credit markets. ■

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ENDNOTES

¹ For additional detail on monetary policy implementation, see Ennis, Huberto M., and Todd Keister. "Understanding Monetary Policy Implementation." Federal Reserve Bank of Richmond *Economic Quarterly*, Summer 2008, vol. 94, no. 3, pp. 235-263.

² For more on daylight credit and its interaction with IOR policy, see Ennis, Huberto M. and John A. Weinberg. "Interest on Reserves and Daylight Credit." Federal Reserve Bank of Richmond *Economic Quarterly*, Spring 2007, vol. 93, no. 2, pp. 111-142.

³ Keister, Todd and James McAndrews. "Why are Banks Holding So Many Excess Reserves?" *Federal Reserve Bank of New York Staff Reports*, July 2009, No. 380.

⁴ Bernanke, Ben S. "The Federal Reserve's Balance Sheet: An Update." Speech at the Federal Reserve Board Conference on Key Developments in Monetary Policy, October 8, 2009, Washington, D.C.

⁵ Goodfriend, Marvin. "Interest on Reserves and Monetary Policy." Federal Reserve Bank of New York *Economic Policy Review*, May 2002, vol. 8, no. 1, pp. 13-29.

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