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Why Are Banks Holding So Many Excess Reserves?

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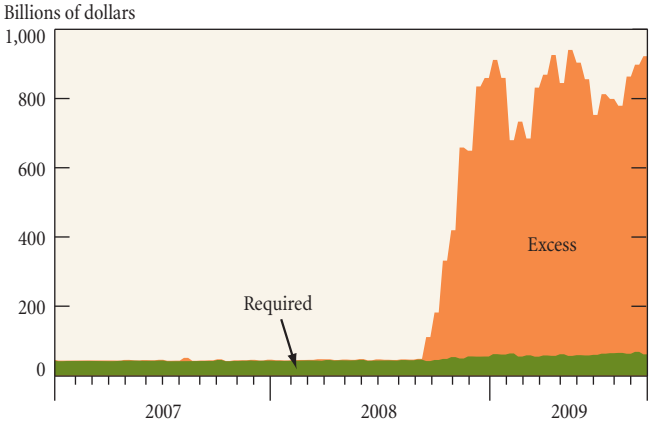
The buildup of reserves in the U.S. banking system during the financial crisis has fueled concerns that the Federal Reserve's policies may have failed to stimulate the flow of credit in the economy: banks, it appears, are amassing funds rather than lending them out. However, a careful examination of the balance sheet effects of central bank actions shows that the high level of reserves is simply a by-product of the Fed's new lending facilities and asset purchase programs. The total quantity of reserves in the banking system reflects the scale of the Fed's policy initiatives, but conveys no information about the initiatives' effects on bank lending or on the economy more broadly.

The quantity of reserves in the U.S. banking system has grown dramatically over the course of the financial crisis. *Reserves* are funds held by a bank, either as balances on deposit at the Federal Reserve or as cash in the bank's vault or ATMs, that can be used to meet the bank's legal reserve requirement. The level of reserves began to rise following the collapse of Lehman Brothers in mid-September 2008, climbing from roughly $45 billion to more than $900 billion by January 2009 (see the chart on page 2). While *required* reserves—funds that are actually used to fulfill a bank's legal requirement—grew modestly over this period, this increase was dwarfed by the large and unprecedented rise in the additional balances held, or *excess* reserves.

Some commentators see the surge in excess reserves as a troubling development—evidence that banks are hoarding funds rather than lending them out to households, firms, and other banks. Edlin and Jaffee (2009, p. 2), for example, identify the high level of excess reserves as the "problem" behind the continuing credit crunch—or, "if not the problem, one heckuva symptom." Other observers see the large increase in excess reserves as a sign that many of the steps taken by the Federal Reserve during the crisis have been ineffective. Instead of restoring the flow of credit to firms and households, they argue, the money the Fed has lent to banks and other financial intermediaries since September 2008 is sitting idle in banks' reserve accounts.

These views have led to proposals aimed at discouraging banks from holding excess reserves. The proposals include placing a tax on excess reserves (Sumner 2009) or setting a cap on the amount of excess reserves each bank is allowed to hold (Dasgupta 2009). Mankiw (2009) notes that economists in earlier eras also criticized the stockpiling of money during times of financial stress and favored a tax on money holdings to encourage lending. Relating these past issues to the

Aggregate Reserves of Depository Institutions



Source: Federal Reserve Statistical Release H.3, "Aggregate Reserves of Depository Institutions and the Monetary Base."

current situation, he remarks that "with banks now holding substantial excess reserves, [this historical] concern about cash hoarding suddenly seems very modern."

In this edition of *Current Issues*, we argue that the concerns about high levels of reserves are largely unwarranted. Using a series of simple examples, we show how central bank liquidity facilities and other credit programs create—essentially as a by-product—a large quantity of reserves. While the level of required reserves may change modestly with changes in bank lending behavior, the vast majority of the newly created reserves will end up being held as excess reserves regardless

A large increase in the quantity of reserves in the banking system need not be inflationary, since the central bank can adjust short-term interest rates independently of the level of reserves.

of how banks react to the new programs. In other words, the substantial buildup of reserves depicted in the chart reflects the large scale of the Federal Reserve's policy initiatives, but says little or nothing about the programs' effects on bank lending or on the economy more broadly.

This conclusion may seem strange, at first glance, to readers familiar with textbook accounts of the money multiplier. In these accounts, an increase in reserves is always "multiplied" into a larger increase in the broad money supply and thereby raises required reserves until the level of excess reserves is negligible. This process has clearly not taken place. After presenting our examples, we explain why the money multiplier is inoperative in the current environment, where reserves have increased to unprecedented levels and the Federal Reserve has begun paying interest on those reserves. We also argue that a large increase in the quantity of reserves in the banking system need not be inflationary, since the central bank can adjust short-term interest rates independently of the level of reserves by changing the interest rate it pays on reserves.

Central Bank Lending: A Simple Example

To clarify how the types of policies implemented by the Federal Reserve over the course of the financial crisis affect individual banks' balance sheets and the level of reserves in the banking system as a whole, we present a simple example. Consider the balance sheets of two banks, labeled A and B (Exhibit 1). Focus first on the items in black. On the liabilities

A central bank's extension of credit to banks during a financial crisis creates, as a by-product, a large quantity of excess reserves.

side of the balance sheet, each bank has started with $10 of capital and has taken in $100 in deposits. On the asset side of the balance sheet, both banks hold reserves and make loans. For simplicity, we assume that the banks are required to hold reserves equaling 10 percent of their deposits, and that each bank holds exactly $10 in reserves.

Suppose that Bank B has access to a larger pool of lending opportunities than does Bank A—perhaps because it is located in an area with a higher concentration of firms that actively rely on bank loans or because it has special expertise in evaluating certain types of loan applications. Whatever the reason, Bank B has found it profitable at the current level of interest rates to make $130 of loans, while Bank A has found it profitable to make only $50 of loans. To be able to lend this greater amount, Bank B has borrowed $40 from Bank A. This interbank loan is represented by the green entries in the banks' balance sheets. The loan is an asset for Bank A, which will receive the repayment in the future, and a liability for Bank B. Note the important economic role of interbank lending in this example: it allows funds to flow to their most productive uses, regardless of which bank received the initial deposits. The balance sheets in Exhibit 1 reflect the normal state of affairs, when the interbank market is performing this function

EXHIBIT 1

Bank Balance Sheets during Normal Times

Dollars

Bank A

Assets		Liabilities	
Reserves	10	Deposits	100
Loans	50		
Due from Bank B	40		
Securities	10	Capital	10

Bank B

Assets		Liabilities	
Reserves	10	Deposits	100
Loans	130	Due to Bank A	40
Securities	10	Capital	10

EXHIBIT 2

Bank Balance Sheets after Central Bank Lends to Bank B

Dollars

Bank A

Assets		Liabilities	
Reserves	50	Deposits	100
Loans	50		
Securities	10	Capital	10

Bank B

Assets		Liabilities	
Reserves	10	Deposits	100
Loans	130	Due to Central Bank	40
Securities	10	Capital	10

efficiently. Note too that total reserves in the banking system are $20, all of which are required reserves. Our simple example assumes that no excess reserves are held in normal times.

Now suppose that the financial system enters a period of turmoil that disrupts the normal pattern of interbank lending. Such a market "freeze" might reflect banks' concerns about the creditworthiness of their counterparties or uncertainty about their own future funding needs. Suppose that, in this environment, Bank A is unwilling to continue lending to Bank B. This disruption places a strain on Bank B when it must repay Bank A: if it is unable to obtain a similar loan elsewhere, or to raise new deposits quickly, it will be forced to reduce its loans by $40. This cutback in lending would be accompanied by a decline in total deposits as the households and firms that had borrowed from Bank B scrambled for funds to repay their loans, and by a contraction in economic activity.[1]

One way the central bank could react to this freeze in interbank lending is by using the standard tool of monetary policy: a change in interest rates. Central banks typically implement monetary policy by setting a target for a particular short-term interest rate.[2] When the central bank lowers this target rate, other interest rates tend to decrease as well, stimulating economic activity. As a result, some lending opportunities that were previously unattractive become profitable. In our example, a decrease in interest rates would lead Bank A to make more loans as it receives repayment from Bank B—a response that would partially offset the decline in Bank B's lending.

Given the nature of the problem in our example, however, the central bank might be able to intervene more effectively in another way. Suppose that the central bank chooses not to lower its target interest rate and instead lends $40 directly to Bank B. In practice, central banks have lent directly to banks in a variety of ways during the financial crisis, using both existing discount window facilities and new programs such as the Fed's Term Auction Facility. In our example, the central bank simply credits $40 to Bank B's reserve account. Bank B can then use these funds to repay Bank A without decreasing its lending.

Merely looking at the aggregate data on bank reserves might lead one to conclude that the central bank's policy did nothing to promote bank lending. . . . In fact, the central bank's action was highly effective.

The banks' balance sheets after these actions have taken place are shown in Exhibit 2, where the changes from the earlier figure appear in red. For Bank B, the loan from the central bank has replaced the interbank loan. Bank A now holds as reserves the funds that it previously lent to Bank B. Note that as a consequence of the central bank's intervention, reserve holdings have increased markedly: while deposits are unchanged, total reserves for the two banks have risen from $20 to $60 and excess reserves now equal $40.

This simple example illustrates how a central bank's extension of credit to banks during a financial crisis creates, as a by-product, a large quantity of excess reserves. Merely looking

[1] Alternatively, Bank A might be willing to continue lending to Bank B, but at a significantly higher interest rate to compensate for the increased credit risk or the uncertainty surrounding its own future need for funding. A key feature of the current financial crisis has been the unusually large spread between the interest rate on term (that is, longer than one day) interbank loans, as measured by the London interbank offered rate (Libor), and benchmark measures of the overnight interest rate. The effects of such a scenario would be similar to the market "freeze" discussed above: at a higher interest rate, Bank B would choose to borrow less from Bank A and would decrease its level of lending to its customers, leading to a contraction in economic activity.

[2] In the United States, for example, the Federal Open Market Committee (FOMC) sets a target for the federal funds rate, which is the market interest rate on overnight interbank loans. It is worth noting that the special features of the federal funds market, including the very short duration of the loans, make it less susceptible to freezes and other disruptions than longer term lending markets.

at the aggregate data on bank reserves might lead one to conclude that the central bank's policy did nothing to promote bank lending, since all of the $40 lent by the central bank ended up being held as excess reserves. The example shows that this conclusion would be unwarranted. In fact, the central bank's action was highly effective: it prevented Bank B from having to reduce its lending to firms and households by $40.

Excess Reserves and Interest Rates

Actions by a central bank that change the quantity of reserves in the banking system also tend to change the level of interest rates. Traditionally, bank reserves did not earn any interest. If Bank A earns no interest on the reserves it is holding in Exhibit 2, it will have an incentive to lend out its excess reserves or to use them to buy other short-term assets. These activities will, in turn, decrease short-term market interest rates and hence may lead to an increase in inflationary pressures.

This link between the quantity of reserves and market interest rates implies that the central bank has two distinct and potentially conflicting policy objectives during a financial crisis. In choosing an appropriate target for the short-term interest rate, the central bank considers macroeconomic conditions and its forecast for output, employment, and inflation. In our example, we have assumed that the central bank's target rate is unchanged.[3] In choosing an appropriate lending policy, in contrast, the central bank considers the nature and severity of the disruption in financial markets. A conflict arises because the central bank's lending policy will tend to push the market interest rate below its target level.

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If the amount of central bank lending is relatively small, this conflict can be resolved using open market operations. In particular, the central bank could offset, or *sterilize*, the effects of its lending by selling bonds from its portfolio to remove the excess reserves. Returning to our example in Exhibit 2, suppose the central bank sells $40 worth of government bonds from its portfolio and these bonds are all purchased by Bank A. When Bank A pays for these bonds—by giving $40 in reserves to the central bank—the quantity of excess reserves in the banking system will return to zero. Because Bank A will then be holding interest-bearing bonds instead of reserves, it will not have an incentive to change its lending behavior. In this way, the open market operation prevents market interest rates from falling below the central bank's target. Note, however, that this approach is limited by the quantity of bonds that the central bank is able to sell from its portfolio.

A second way in which the central bank could eliminate the tension between its conflicting policy objectives is to pay interest on reserves. When banks earn interest on their reserves, they have no incentive to lend at interest rates lower than the rate paid by the central bank. The central bank can therefore adjust the interest rate it pays on reserves to steer the market interest rate toward its target level. In October 2008, the Federal Reserve began paying interest on reserves for the first time in its history. This action was taken to "give the Federal Reserve greater scope to use its lending programs to address conditions in credit markets while also maintaining the federal funds rate close to the target established by the Federal Open Market Committee" (Board of Governors of the Federal Reserve System 2008).[4]

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In our example in Exhibit 2, suppose the central bank sets the interest rate it pays on reserves equal to its target for the market interest rate. This policy, advocated by

[3] In practice, the conditions that led to the freeze in the interbank market might change the central bank's forecast for the factors influencing inflation and economic growth and, hence, its desired short-term interest rate. Even in such a case, however, the central bank's target rate is likely to differ from the rate that would result from Bank A's efforts to lend out its excess reserves.

[4] Many other central banks also pay interest on reserves as part of their procedure for implementing monetary policy. See Goodfriend (2002) and Keister, Martin, and McAndrews (2008) for a discussion of how paying interest on reserves allows a central bank to separate the quantity of bank reserves from its monetary policy objectives. See Ennis and Keister (2008) for a more formal treatment of the process of monetary policy implementation and the effects of paying interest on reserves. Goodfriend (2009) proposes a new way of classifying a central bank's policy tools. In his terminology, *monetary policy* refers to changes in the monetary base (reserves plus currency in circulation), while *interest rate policy* refers to changes in the interest rate paid on reserves and *credit policy* refers to changes in the composition of the central bank's assets.

Goodfriend (2002), Woodford (2000), and others, removes the opportunity cost of holding reserves—that is, the revenue forgone by a bank when it does not lend out its excess reserves. The interest Bank A earns by holding $40 of excess reserves will now be roughly equal to what it previously earned by lending to Bank B. As a result, Bank A again has no incentive to change its lending behavior and the market interest rate will remain at the central bank's target level.

Other Lending and Purchase Policies

In addition to lending to banks, central banks have implemented a range of other policy responses to the financial crisis, including lending directly to firms and purchasing certain types of assets. The Federal Reserve, for example, has implemented credit programs for primary dealers and other financial institutions, opened currency swap lines with foreign

Loans to banks, loans to other firms, and direct asset purchases by the central bank all increase the level of reserves in the banking system by exactly the amount lent.

central banks, purchased mortgage-backed securities guaranteed by certain government-sponsored enterprises (GSEs), and directly purchased debt issued by housing-related GSEs. How do these other types of policies affect the level of reserves in the banking system?

To answer this question, we return to our example. Suppose now that the central bank lends $40 directly to Firm X, which holds a deposit account at Bank A. In making this loan, the central bank credits $40 to Bank A's reserve account and Bank A, in turn, credits $40 to Firm X's deposit account. Bank A's balance sheet subsequent to these transactions is presented in Exhibit 3.

As the exhibit shows, both the deposits and the reserves of Bank A have increased by $40. Total reserves in the banking system have now risen from $60 to $100. Even though the central bank made this loan directly to Firm X and not to a bank, the loan still creates an equal amount of reserves in the banking system. This is a general principle: loans to banks, loans to other firms, and direct asset purchases by the central bank all increase the level of reserves in the banking system by exactly the amount lent. (See the box on page 7 for a discussion of the relationship between the size of the Fed's policy initiatives and the quantity of total reserves.)

EXHIBIT 3

Bank Balance Sheets after Central Bank Lends to Firm X

Dollars

Bank A

Assets		Liabilities	
Reserves	90	Deposits	140
Loans	50		
Securities	10	Capital	10

Bank B

Assets		Liabilities	
Reserves	10	Deposits	100
Loans	130	Due to Central Bank	40
Securities	10	Capital	10

Bank Lending and Total Reserves

When interpreting data on reserves, it is important to keep in mind that the quantity of reserves in the banking system is determined almost entirely by the central bank's actions. An individual bank can reduce its reserves by lending them out or using them to purchase other assets, but these actions do not change the total level of reserves in the banking system. A discussion of this somewhat counterintuitive point can be found in most textbooks on money and banking, but its importance in the current environment leads us to offer a brief treatment here as well.

Recall Exhibit 3, which showed the balance sheet effects of a central bank loan to Firm X. Suppose that Bank A gives a new loan of $20 to Firm X, which continues to hold a deposit account with Bank A. Bank A makes this loan by crediting $20

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to Firm X's account. The bank now has a new asset (the loan to Firm X) and an offsetting liability (the increase in Firm X's deposit at the bank). Significantly, Bank A still has $90 of reserves in its account. In other words, the loan to Firm X does not decrease Bank A's reserve holdings at all.

Next, suppose that Firm X uses the $60 it has borrowed from the central bank and from Bank A to purchase goods and services from Firm Y. Suppose further that Firm Y holds its deposit account with Bank B. A payment, either in check or electronic form, will be made that debits $60 from Bank A's reserve account and credits $60 to Bank B's reserve account. Bank B will then credit these funds to Firm Y's deposit account, so that Bank B has larger assets (a $60 increase in reserves)

EXHIBIT 4

Bank Balance Sheets with Increased Lending by Bank B

Dollars

Bank A

Assets		Liabilities	
Reserves	30	Deposits	100
Loans	70		
Securities	10	Capital	10

Bank B

Assets		Liabilities	
Reserves	70	Deposits	160
Loans	130	Due to Central Bank	40
Securities	10	Capital	10

and larger liabilities (a $60 increase in deposits). Meanwhile, Bank A's reserves have fallen by $60, as have its deposits. The balance sheets of the two banks after these transactions have been completed are shown in Exhibit 4. What is most noteworthy is that the total amount of reserves in the banking system has not changed: it is still $100. The $20 loan and the subsequent $60 purchase by Firm X have simply transferred funds from the reserve account of Bank A to that of Bank B.

The general idea here should be clear: while an individual bank may reduce the level of reserves it holds by lending to firms and/or households, the same is *not* true of the banking system as a whole. No matter how many times the funds are

While an individual bank may reduce the level of reserves it holds by lending to firms and/or households, the same is not *true of the banking system as a whole.*

lent out by the banks or used to make purchases, total reserves in the banking system do not change. In particular, one cannot infer from the high level of aggregate reserves in Exhibit 4 that banks are "hoarding" funds rather than lending them out. The total quantity of reserves is determined almost entirely by the central bank's actions, and in no way reflects the lending behavior of banks.[5]

[5] Some of the factors that change the level of total reserves are not under the control of the central bank, such as payments into and out of the Treasury's account at the central bank or changes in the amount of currency held by the public. However, the changes in these "autonomous factors" have been very small compared with the changes in reserves depicted in the chart on page 2. For the purposes of this discussion, one can safely disregard these other factors and focus solely on how the level of reserves is affected by the size of the central bank's policy initiatives.

Required versus Excess Reserves

While lending by banks does not change the total level of reserves in the banking system, it does affect the composition of that total between required reserves and excess reserves. In the situations depicted in Exhibits 3 and 4, for example, the new loans made to Firm X and the corresponding increase in deposits will raise the level of required reserves. Nevertheless, the vast majority of the newly created reserves are held as excess reserves.

This last point is apparent in the changes our two banks' balance sheets undergo from Exhibit 1 to Exhibit 4. Under the assumption that the required reserve ratio is 10 percent for all deposits, required reserves for Banks A and B together will

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increase from $20 to $26. Total reserves in the banking system have risen from $20 to $100; if required reserves account for $6 of the increase, then excess reserves account for $74, clearly a much larger share. Also notable is that the dramatic increase in excess reserves coincides with an increase in bank lending—from $180 in the pre-crisis situation depicted in Exhibit 1 to $200 following the loans to Firm X recorded in Exhibit 4. Together, these facts demonstrate that a steep rise in excess reserves cannot be interpreted as evidence that the central bank's actions have been ineffective at promoting the flow of credit to firms and households.

What about the Money Multiplier?

The fact that banks continue to hold a large quantity of excess reserves conflicts with the traditional notion of the money multiplier. According to this notion, an increase in bank reserves should be "multiplied" into a much larger increase in the broad money supply as banks expand their deposits and lending activities. The expansion of deposits, in turn, should raise the level of required reserves until there are little or no excess reserves in the banking system. This process has clearly not occurred following the increase in reserves depicted in the chart on page 2. Why has the money multiplier "failed" here?

Textbook accounts of the money multiplier assume that banks do not earn interest on their reserves. As noted earlier,

Sources of Bank Reserves

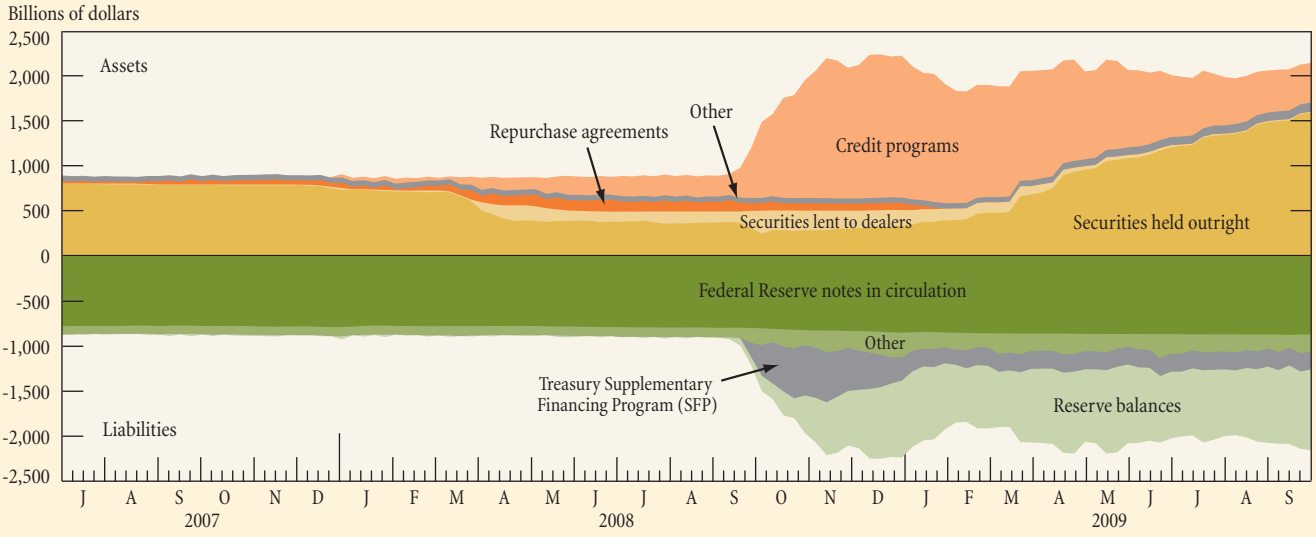
Since September 2008, the quantity of reserves in the U.S. banking system has been closely tied to the size of the Fed's liquidity facilities and other credit programs. This relationship is highlighted in the chart below, which presents the total assets of the Federal Reserve System in the top half of the image and the total liabilities of the System in the bottom half.[a] Before the crisis (left portion of the chart), the Federal Reserve's assets were predominantly Treasury securities, as indicated by the gold area in the top half of the image. Its liabilities were predominantly currency, in the form of Federal Reserve notes, as represented by the dark green area in the bottom half of the image. Reserve balances, the light green area at the bottom of the image, were small enough to be almost unnoticeable.[b]

The Federal Reserve introduced the first of its new liquidity facilities in December 2007. The total size of the liquidity facilities and other credit programs is represented by the light orange area at the top of the image. Between December 2007 and September 2008, the Federal Reserve actively sterilized these programs through open market operations, selling securities from its portfolio to remove the newly created reserves. This activity can be seen in the middle portion of the top half of the image, where the quantity of Treasury securities falls in a way that offsets the growth of the credit programs.

Beginning in September 2008, however, the Federal Reserve increased the scale of its initiatives substantially in the face of rapidly deteriorating financial conditions. The size of the credit programs quickly became larger than the Fed's holdings of Treasury securities, so that sterilization through open market operations was no longer possible. As a result, reserve balances began to grow. To partly offset this growth, the U.S. Treasury introduced the Supplementary Financing Program (SFP), represented by the grey area in the chart. Under the SFP, the Treasury issued new securities and left the proceeds from the sale of these securities on deposit at the Federal Reserve; the net effect of this operation was to remove reserves from the banking system. The size of the SFP was limited, however, and as the credit programs continued to expand, reserve balances began to grow rapidly. The chart shows how total reserve balances have evolved in a way that closely mirrors the changing size of these programs.

The Federal Reserve's large-scale purchases of assets, first announced in November 2008, can also be seen in the chart. As the programs for purchasing agency mortgage-backed securities, agency debt, and longer term Treasury debt became operational in early 2009, the amount of securities held outright (the gold area) began to increase. Such purchases tend to increase the level of reserve balances. However, use of the credit programs declined over this period, leaving the total level of reserve balances roughly unchanged.[c]

Assets and Liabilities of the Federal Reserve System



Source: Federal Reserve Statistical Release H.4.1, "Factors Affecting Reserve Balances."

[a] We are grateful to Ruth Judson, who created the original design for this chart and generously shared her expertise with us.

[b] The light green area in the chart represents only those reserves that are held as balances on deposit at the Federal Reserve. Reserves that are held as cash in a bank's vault or ATM network are counted as currency and included in the dark green area. This latter component of reserves has been relatively constant over the course of the crisis; reserve balances account for almost all of the increase in total reserves.

[c] The credit programs plotted in the chart include the following items from Federal Reserve Statistical Release H.4.1: term auction credit, other loans (including discount window loans, the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, credit extended to American International Group Inc., and the Term Asset-Backed Securities Loan Facility), net portfolio holdings of the Commercial Paper Funding Facility, net portfolio holdings of the various Maiden Lane LLCs, and central bank liquidity swaps.

a bank holding excess reserves in such an environment will seek to lend out those reserves at any positive interest rate, and this additional lending will lower the short-term interest rate. This lending also creates additional deposits in the banking system and thus leads to a small increase in reserve requirements, as described in the previous section. Because the increase in required reserves is small, however, the supply of excess reserves remains large. The process then repeats itself, with banks making more new loans and the short-term interest rate falling further.

The multiplier process could continue until excess reserves are eliminated—that is, until the increase in lending and deposits has raised required reserves all the way up to the level of total reserves. If this happens, the money multiplier will be fully operational. However, the process will stop earlier if

Textbook accounts of the money multiplier assume that banks do not earn interest on their reserves. . . . If the central bank pays interest on reserves at its target *interest rate, . . . then banks never face an opportunity cost of holding reserves and the money multiplier does not come into play.*

the short-term interest rate reaches zero. When the market interest rate is zero, the opportunity cost associated with holding reserves disappears. At this point, banks no longer have an incentive to lend out their excess reserves, and the multiplier process halts.

As noted earlier, however, most central banks now pay interest on reserves. When reserves earn interest, the multiplier process will not continue to the point where the market interest rate is zero. Rather, it will stop when the market rate reaches the rate paid by the central bank, since if these rates are the same, banks no longer face an opportunity cost of holding reserves. If the central bank pays interest on reserves at its *target* interest rate, as we assumed in our example above, then banks never face an opportunity cost of holding reserves and the money multiplier does not come into play.

It is important to keep in mind that the excess reserves in our example were not created with the goal of lowering interest rates or increasing bank lending significantly relative to pre-crisis levels. Rather, these reserves were created as a by-product of policies designed to mitigate the effects of a disruption in financial markets. In fact, the central bank paid interest on reserves to prevent the increase in reserves from driving market interest rates below the level it deemed appropriate given macroeconomic conditions. In such a situation, the absence of a money-multiplier effect should be neither surprising nor troubling.

Is the Large Quantity of Reserves Inflationary?

Some observers have expressed concern that the large quantity of reserves will lead to an increase in the inflation rate unless the Federal Reserve acts to remove them quickly once the economy begins to recover. Meltzer (2009), for example, worries that "the enormous increase in bank reserves—caused by the Fed's purchases of bonds and mortgages—will surely bring on severe inflation if allowed to remain." Feldstein (2009) expresses a similar concern, noting that "when the economy begins to recover, these reserves can be converted into new loans and faster money growth" that will eventually prove inflationary. Under a traditional operating framework, in which the central bank influences interest rates and the level of economic activity by changing the quantity of reserves, these concerns would be justified. Now that the Federal Reserve is paying interest on reserves, however, matters are different.

A recovering economy will bring increased investment opportunities, spurring firms' demands for bank loans. Consequently, banks will be presented with more lending

Paying interest on reserves allows the central bank to follow a path for short-term interest rates that is independent of the level of reserves. By choosing this path appropriately, the central bank can guard against inflationary pressures even if financial conditions lead it to maintain a high level of excess reserves.

opportunities that are profitable at the current level of interest rates. As banks lend more, new deposits will be created and the general level of economic activity will rise. Left unchecked, this growth in lending and economic activity may generate inflationary pressures. Under a traditional operating framework, in which no interest is paid on reserves, the central bank would indeed have to remove nearly all of the excess reserves from the banking system in order to raise market interest rates and curb banks' willingness to lend.

Paying interest on reserves breaks this link between the quantity of reserves and banks' willingness to lend. By raising the interest rate it pays on reserves, the central bank can increase market rates and slow the growth of bank lending and economic activity without changing the quantity of reserves. In other words, paying interest on reserves allows the central bank to follow a path for short-term interest rates that is independent of the level of reserves. By choosing this path appropriately, the central bank can guard against inflationary pressures even if financial conditions lead it to maintain a high level of excess reserves.[6]

This logic applies equally well when financial conditions are stable. A central bank may choose to maintain a high level of reserve balances in normal times because doing so offers some important advantages, particularly for the operation of the payments system. For example, when banks hold more reserves, they tend to rely less on daylight credit from the central bank to make their payments. They also tend to send payments earlier in the day, which reduces the likelihood of a significant operational disruption or of gridlock in the payments system. To capture these benefits, a central bank may opt to create a high level of reserves as part of its normal operations, again using the interest rate it pays on reserves to influence market interest rates. The Reserve Bank of New Zealand has used this type of framework since 2006.[7]

Conclusion

We began this article by asking, Why are banks holding so many excess reserves? We then used a series of simple examples to answer this question in two steps. First, we showed that the liquidity facilities and other credit programs introduced by the Federal Reserve in response to the crisis have created, as a by-product, a large quantity of reserves in the banking system. Second, we showed that while the lending decisions and other activities of banks may result in small changes in the level of required reserves, the vast majority of the newly created reserves will end up being held as excess reserves. The dramatic buildup of excess reserves reflects the *large scale* of the Federal Reserve's policy initiatives; it conveys no information about the *effects* of these initiatives on bank lending or on the level of economic activity.

We also discussed the importance of paying interest on reserves when the level of excess reserves is unusually high, as the Federal Reserve began to do in October 2008. Paying interest on reserves allows a central bank to maintain its influence over market interest rates irrespective of the quantity of reserves in the banking system. The central bank can then scale its policy initiatives according to conditions in the financial sector, while setting its target for the short-term interest rate in response to macroeconomic conditions. This ability to separate short-term interest rates from the quantity of reserves is particularly important during the recovery from a financial crisis. If inflationary pressures begin to appear while the crisis-related programs are still in place, the central bank can use its interest-on-reserves policy to raise interest rates without necessarily removing all of the newly created reserves.

The dramatic buildup of excess reserves reflects the large scale of the Federal Reserve's policy initiatives; it conveys no information about the effects of these initiatives on bank lending or on the level of economic activity.

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[6] See Borio and Disyatat (2009) for an extensive discussion of this issue.

[7] See Ennis and Weinberg (2007) for an analysis of the relationships between paying interest on reserves, the level of reserve balances, and the operation of the payments system. See Nield (2008) for a detailed discussion of the Reserve Bank of New Zealand's operating framework.

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CURRENT ISSUES ARTICLES ON THE FEDERAL RESERVE'S LIQUIDITY PROGRAMS

The Federal Reserve's Primary Dealer Credit Facility

Tobias Adrian, Christopher R. Burke, and James J. McAndrews
August 2009, Volume 15, Number 4

As liquidity conditions in the "repo market"—the market where broker-dealers obtain financing for their securities—deteriorated following the near-bankruptcy of Bear Stearns in March 2008, the Federal Reserve took the step of creating a special facility to provide overnight loans to dealers that have a trading relationship with the Federal Reserve Bank of New York. Six months later, in the wake of new strains in the repo market, the Fed expanded the facility by broadening the types of collateral accepted for loans. Both initiatives were designed to help restore the orderly functioning of the market and to prevent the spillover of distress to other financial firms.

The Term Securities Lending Facility: Origin, Design, and Effects

Michael J. Fleming, Warren B. Hrung, and Frank M. Keane
February 2009, Volume 15, Number 2

The Federal Reserve launched the Term Securities Lending Facility (TSLF) in 2008 to promote liquidity in the funding markets and improve the operation of the broader financial markets. The facility increases the ability of dealers to obtain cash in the private market by enabling them to pledge securities temporarily as collateral for Treasuries, which are relatively easy to finance. The TSLF thus reduces the need for dealers to sell assets into illiquid markets as well as lessens the likelihood of a loss of confidence among lenders.

The Federal Reserve's Term Auction Facility

Olivier Armantier, Sandra Krieger, and James J. McAndrews
July 2008, Volume 14, Number 5

As liquidity conditions in the term funding markets grew increasingly strained in late 2007, the Federal Reserve began making funds available directly to banks through a new tool, the Term Auction Facility (TAF). The TAF provides term funding on a collateralized basis, at interest rates and amounts set by auction. The facility is designed to improve liquidity by making it easier for sound institutions to borrow when the markets are not operating efficiently.