
Monetary Policy and the Zero Bound: Policy Options When Short-Term Rates Reach Zero

By Gordon H. Sellon, Jr.

In response to continuing weakness in economic activity, the Federal Reserve has lowered its target for the overnight federal funds rate from 6½ percent to 1 percent over the past two and one-half years. Recently, concern has been expressed in the news media and among academic economists and policymakers that additional steps to ease monetary policy could cause the federal funds rate target to hit a lower limit of zero percent. In this event, it would not be possible to lower the target any further, and the Federal Reserve would have to alter its procedures for implementing monetary policy to provide additional policy stimulus.

Much of the commentary on the “zero bound problem” has focused on what policy options the Federal Reserve would have and whether they would be effective if further monetary stimulus was needed. Additionally, while the recent discussion has been mostly hypothetical, some commentators have suggested that the current situation has disturbing parallels to the U.S. economy in the 1930s and to the Japanese economy over the past decade. In both situations, with short-term interest rates near zero, monetary policy has been seen to be ineffective in reversing a prolonged economic slump.

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This article examines how monetary policy can be conducted when short-term interest rates reach the zero bound and whether policy is likely to be effective in this situation. The article suggests that concerns about the zero bound as a constraint on monetary policy are greatly exaggerated. Even when short-term interest rates are near zero, central banks will generally have considerable scope to expand bank credit and to lower longer-term interest rates. And, in the event the banking system does not function effectively or long-term rates also reach zero, further options are available to provide policy stimulus. Moreover, a closer look at the historical experience in the United States and Japan suggests that the central problem in these situations was not the existence of a zero bound per se but, rather, a weakened banking system that limited the effectiveness of monetary policy.

The first section of the article explores the nature of the zero bound problem, focusing on the complications for implementing monetary policy, possible effects on short-term financial markets, and the potential scope for policy once the zero bound is reached. The second section examines the principal options a central bank has to implement policy when short-term rates reach zero. These include: increasing the quantity of reserves in the banking system, directly targeting longer-term interest rates, and managing financial market expectations of future monetary policy actions. The third section looks at the historical experience of the United States in the 1930s and Japan over the last decade to evaluate the significance of the zero bound as an impediment to monetary policy. The fourth section discusses a further range of policy options open to a central bank in the more extreme situation where there is little additional scope for lowering longer-term rates and where the banking system is dysfunctional.

I. THE NATURE OF THE ZERO BOUND PROBLEM

Because nominal interest rates cannot ordinarily be negative, once the overnight rate reaches zero, a central bank that targets the overnight rate will have to change its operating procedures to ease policy further.¹ The zero bound also poses potential problems for the functioning of

short-term money markets that could conceivably have implications for monetary policy. In light of these potential difficulties, it is important to understand the scope for monetary policy at the zero bound.

Complications for the implementation of monetary policy

To see the problems posed by the zero bound, it is helpful to briefly consider how monetary policy operates. Generally speaking, central banks implement monetary policy by altering the price and quantity of reserve or settlement balances held by depository institutions at the central bank. For example, central banks ease policy by supplying more reserve balances than are demanded at the current overnight interest rate, which pushes the overnight rate lower.

A key issue for the central bank is to decide how many reserve balances to supply to achieve its ultimate objectives of price stability and sustainable economic growth. One traditional method of doing this is to determine what growth in the supply of money is needed to achieve its desired inflation and growth objectives and then to figure out how many reserves to provide to reach this money growth objective. In this framework, policy is eased or tightened by increasing or decreasing the targeted quantity of reserves.

In practice, most central banks have shifted away from this “quantitative” approach in recent years in favor of targeting the overnight interest rate on reserve balances. Under interest rate targeting, the central bank determines what level of the overnight interest rate is consistent with its inflation and growth objectives and then supplies the necessary amount of reserves to achieve this target interest rate. In this approach to implementing monetary policy, policy is eased or tightened by lowering or raising the target interest rate.

Central banks have moved away from quantitative targeting to interest rate targeting for two main reasons. First, it is technically easier to implement interest rate targeting because this approach does not rely on knowledge of money demand or the behavior of the banking system, both of which have undergone significant changes in many countries in recent years due to deregulation and financial innovation.² Second, interest rate targeting appears to be more transparent and easier for financial markets to understand. Financial market participants tend to

think in terms of how current and future monetary policy are likely to affect the overall structure of interest rates. This task may be easier when the stance of policy is calibrated in terms of an interest rate target rather than a quantity of reserves.³

The main disadvantage of interest rate targeting, of course, is that this approach is subject to the zero bound, and once the bound is reached, policymakers cannot ease policy by reducing the target interest rate. In contrast, reserves targeting is not limited by a zero bound. Indeed, the ability of the central bank to ease policy under the quantitative approach is only limited by its ability to purchase eligible assets via open market operations or to provide funds through the discount window.⁴

Once the zero bound is reached, central banks will be forced to change their procedures for implementing a further easing of monetary policy; that is, they will need a new guide for determining how many reserves to supply to achieve their longer-run macroeconomic objectives. Potential options are examined in more detail in Section II of this article.

Potential effects on short-term financial markets

In addition to implications for the implementation of monetary policy, the zero bound may also influence the functioning of short-term money markets, which in turn could affect the transmission mechanism of monetary policy. The most immediate effects of the zero bound are likely to be seen in the overnight market for reserve balances. This market serves primarily as a mechanism for depository institutions to eliminate excesses and deficiencies in their reserve accounts. In order for the overnight rate to reach zero on an ongoing basis, all depository institutions would need to be in a continual position of excess reserves, because if any institutions experienced a reserve deficiency, they would seek to borrow in the overnight market, resulting in a positive overnight rate. Thus, once the zero bound is reached, the overnight market would likely cease to function.⁵ In this situation, the monetary transmission mechanism could be severely affected if a central bank tried to increase the quantity of reserves but depository institutions decided to hold the additional reserves as excess reserves rather than making loans or purchasing earning assets.⁶

As the overnight rate approaches the zero bound, other short-term money market rates are also likely to fall toward zero as investors begin to extend the maturity of their investment portfolio in search of higher yields. Consequently, other short-term money markets could be affected by the zero bound problem. For example, considerable attention has been focused recently on the implications of the zero bound for money market mutual funds. Because money market funds invest exclusively in short-term assets, as the yields on these assets decline, some funds may have difficulty covering their costs while still paying a return sufficient to keep investors in the fund. Furthermore, if money funds were to experience an outflow of funds, this could impact the commercial paper market since money funds are the largest institutional supplier of financing to this market.

While the zero bound could cause shrinkage in the size and number of money funds, the effects on the monetary transmission mechanism may be limited. If investors withdraw from money funds, the funds transferred would likely end up in depository institutions.⁷ Moreover, corporations that experienced difficulty in obtaining funds in the commercial paper market would likely turn to banks, leading to a somewhat higher cost of short-term credit for corporations but relatively little impact on the monetary transmission mechanism.

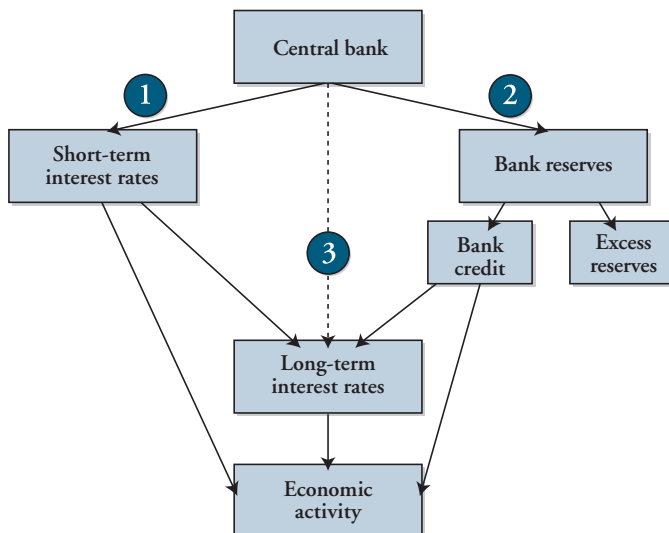
What is the scope for policy at the zero bound?

In light of the potential effects of the zero bound on the implementation of monetary policy and short-term financial markets, it is important to determine what scope there is for policy to provide additional stimulus at the zero bound. This requires a closer look at the monetary policy transmission mechanism.

Generally speaking, monetary policy does not have a direct or immediate effect on economic activity. Rather, monetary policy influences the economy by affecting the cost and quantity of credit provided by the financial system. There are several channels through which monetary policy operates, as represented in the stylized view of the transmission mechanism in Figure 1.⁸

Figure 1

MONETARY POLICY TRANSMISSION MECHANISM



In Figure 1, the first channel (1) highlights the role of changes in short-term interest rates in affecting economic activity via both a direct effect on the cost of short-term credit and indirectly through long-term interest rates. Thus, for example, changes in short-term rates may directly influence short-term consumer and business spending. In addition, to the extent that changes in short-term rates are transmitted to longer-term rates, there may be an effect on residential construction and business fixed investment.

The second channel (2) emphasizes the quantity of credit provided through the banking system. As discussed above, monetary policy actions have their immediate effect on the overnight interest rate and on the quantity of reserves in the banking system. When banks experience an increase in reserves, they will generally use these reserves to acquire earning assets—loans and investment securities—rather than holding excess reserves that do not pay interest. In the short run, banks may loan these reserves in the overnight market, but over the longer run, they will

make higher-yielding consumer and business loans and purchase investment securities. This expansion of bank credit will directly affect economic activity and will also help lower longer-term interest rates.

The third channel (3) indicates the potential ability of a central bank to directly affect long-term interest rates without going through short-term rates or bank credit. In principle, a central bank can directly influence long-term rates by purchasing long-term securities or by altering financial market expectations of the future course of monetary policy. This channel is shown by a dotted line rather than a solid line to emphasize that this channel is not ordinarily employed by central banks for reasons discussed in the next section.

In this stylized view of the monetary transmission mechanism, the zero bound effectively closes down the first channel. That is, at the zero bound, the central bank loses the ability to use a reduction in short-term rates to directly stimulate economic activity or lower longer-term rates. Monetary policy can continue to be effective in stimulating economic activity, however, if the other two channels are operational. The second channel will function as long as the banking system is willing and able to use an increase in reserves to expand its credit creation. The third channel will function if the central bank is willing and able to directly lower longer-term rates.

Thus, in principle, even if the overnight rate is zero, a central bank may have considerable scope to expand bank credit and lower longer-term rates to stimulate the economy. The next section of the article explores these two channels in more depth, focusing on some of the practical difficulties in implementing monetary policy in this environment. Even in the event that all three channels shown in Figure 1 cease to function effectively, a central bank may still have the ability to provide economic stimulus through additional, less traditional channels. These options are discussed in Section IV.⁹

II. POLICY OPTIONS AT THE ZERO BOUND

When the zero bound becomes effective, central banks can potentially provide additional stimulus to economic activity by expanding the quantity of reserves in the banking system, by directly targeting longer-term interest rates, and by attempting to manage financial

market expectations of future monetary policy actions. Each of the alternatives has advantages and disadvantages, and none is clearly superior to the others.

Quantitative reserves targeting

As noted in the previous section, while a central bank cannot set an interest rate target below zero, it can provide an essentially unlimited amount of reserves to the banking system. Thus, one solution to the zero bound constraint is for a central bank to target the amount of reserves provided to the banking system and to increase the targeted quantity of reserves as needed to implement a policy easing. The banking system would be expected to use the excess reserves created by the central bank to expand bank credit by making additional loans and purchasing securities, thus helping to push down medium and longer-term interest rates.¹⁰

Since reserves targeting appears to be a rather obvious and simple solution to the zero bound problem, one might ask whether it has some conceptual or practical limitations to its effectiveness. Indeed, one common criticism of this approach is that the reserves channel, as described in Figure 1, would not operate at the zero bound. When the overnight rate is zero, banks clearly have no incentive to loan their excess reserves in the overnight market. Thus, it is claimed, banks would simply hold any additional reserves provided by the central bank in the form of excess reserves and would not expand lending or purchase securities.

The weakness in this argument is that it implicitly assumes that banks view higher excess reserves as temporary. If additions to excess reserves are seen as temporary and there is no incentive to loan them in the overnight market at a zero return, banks will simply hold the additional reserves. In this situation, the reserves channel would cease to function effectively. If, instead, banks view an increase in excess reserves as relatively permanent, they will want to use these reserves to acquire earning assets that have a positive risk-adjusted yield. This increased quantity of excess reserves allows the banking system to engage in a multiple expansion of bank credit through the traditional reserves multiplier process. Thus, conceptually, the key to the effectiveness of

reserves targeting at the zero bound is whether banks believe that an easing of monetary policy that creates additional excess reserves is likely to be relatively long lasting or quickly reversed.

There are also some practical issues involved in implementing reserves targeting. One problem is the difficulty in determining the right amount of reserves to stimulate economic activity. As discussed earlier, reserves targeting requires additional information about the demand for money and reserves that is not needed under interest rate targeting. If it is hard to obtain accurate information on these factors, a central bank may have difficulty determining the appropriate quantity of reserves to target. In practice, a central bank may be forced to pursue a trial and error approach, progressively increasing the reserves target and watching to see the effects on bank credit and longer-term interest rates.

A second practical issue is how much stimulus is likely to come from the banking system. Generally, when interest rates are very low, economic activity is also weak, and banks experience very weak loan demand. If, in addition, banks are weakly capitalized because of previous loan losses or under increased regulatory scrutiny, they may be reluctant to make new loans. Thus, there are important practical questions about whether the reserves targeting approach can be relied on to work effectively in a low interest rate environment.

Targeting longer-term interest rates

As an alternative to quantitative reserves targeting, a central bank might attempt to directly lower longer-term rates (Figure 1). One way of doing this is to purchase large amounts of longer-term securities to drive up their price and lower their yield. Another approach is to establish a ceiling on the yield on these securities by offering to purchase any securities whose yield might rise above the target rate.

Conceptually, setting a ceiling for a long-term interest rate or set of rates is likely to be the most straightforward approach to achieving lower long-term rates. In this approach, the central bank would establish a maximum interest rate for a long-term security—set below the current market rate—and agree to buy as many additional securities as necessary to keep markets rates from rising above the ceiling.¹¹

Alternatively, instead of establishing a formal ceiling for a long-term rate, a central bank might shift its open market purchases from short-term to longer-term securities, relying on the volume of its purchases to raise the price and lower the yield on the longer-term securities. This procedure is essentially a variant of the reserves targeting approach discussed above, as the direct effects of central bank purchases on longer-term interest rates are accompanied by an expansion of bank reserves and bank credit.

Still another approach that has been suggested is for a central bank to attempt to “twist” the yield curve by purchasing longer term securities to lower their yield while simultaneously selling short-term securities to raise their yield. This approach might be appropriate if a central bank wished to avoid some of the negative effects of the zero bound on the functioning on short-term money markets. In contrast to the preceding procedure, this approach would not typically involve any expansion in bank reserves because the sale of short-term securities would offset the purchase of longer-term securities.

Generally speaking, central banks have relatively little experience with directly manipulating longer-term interest rates. In the United States, for example, the Federal Reserve has not attempted to establish a ceiling for longer-term rates except in support of Treasury debt management operations during and immediately after World War II (Meulendyke, pp. 33-34; Hetzel and Leach). Less formal attempts to manipulate longer-term rates have also been rare. During the 1930s, the Federal Reserve made some attempt to keep longer-term interest rates low by selling short-term securities and purchasing longer-term securities to lengthen the maturity of its security portfolio (Chandler, pp. 308-09 and 340-42). And, in the early 1960s, the Federal Reserve and the Treasury briefly attempted to twist the term structure to deal with balance of payments and debt management problems (Meulendyke, pp. 38-39).

Why have central banks been so reluctant to manipulate longer-term interest rates directly? There appear to be several reasons. First, less formal attempts to influence longer-term rates suffer from some of the same problems as reserves targeting; that is, it is difficult to determine how many securities should be purchased to achieve a given reduction in a longer-term interest rate. Second, acquiring a large

quantity of long-term securities exposes the central bank to potentially large capital losses once the economy recovers and interest rates begin to rise again. Third, central banks may be concerned that their decisions as to which long-term rates to target may influence credit allocation in an undesirable way. Because short-term capital markets tend to be deeper and more liquid than longer-term markets, a central bank can operate in short-term markets without as much influence on the structure of rates. Similarly, operating through the reserves channel allows the banking system rather than the central bank to determine credit allocation.

Finally, and perhaps most important, establishing a ceiling for longer-term rates may pose problems for a central bank's credibility and independence.¹² Once economic recovery begins, investors holding large amounts of longer-term securities are likely to be concerned about the possibility of large capital losses as rates begin to rise. As a result, once markets believe that interest rates will rise, the central bank will be forced to purchase an increased volume of securities, causing bank reserves to rise rapidly. Consequently, the central bank has a strong incentive to end the ceiling program quickly to forestall a buildup of inflationary pressures. At the same time, the government is likely to resist the end of the program because this would raise its borrowing costs. In these circumstances, financial markets may begin to doubt the central bank's commitment to long-run price stability, which would put further pressure on market rates due to higher inflation premiums.

Managing market expectations about future policy

A third option open to central banks when the zero bound is reached is to attempt to lower longer-term interest rates by managing market expectations of future monetary policy actions.¹³ This approach reflects an increased recognition of the importance of policy expectations in determining the behavior of interest rates and asset prices.

Standard theories of the term structure of interest rates suggest that longer-term interest rates are determined mainly by current short-term rates and by market expectations of future short-term rates. Central banks largely control current short-term rates by setting a target for the

overnight rate, and market expectations of how central banks will set future targets for the overnight rate should determine the expected path of future short-term rates (Roley and Sellon).

In this framework, current and expected future policy actions play a key role in the determination of longer-term rates. A decision by the central bank to reduce the current target for the overnight rate will also lower long-term rates by an amount that depends on how long markets believe that the new lower rate will be maintained. For example, if the target rate is lowered by 50 basis points and is expected to remain at the new level for a year, interest rates at maturities out to one year will also fall by 50 basis points. However, rates on longer-term securities will fall by smaller amounts, because the target rate is expected to be raised again after one year.

At any point in time, the current term structure incorporates financial markets' best guess as to the future course of monetary policy.¹⁴ A relatively steep yield curve, with long-term rates significantly higher than current short-term rates, suggests that markets believe that policy will be tightened in the future through an increase in future target rates. In this situation, monetary policy can significantly lower longer-term rates only to the extent that the central bank can convey the message that policy will not be tightened as much or as soon as markets expect. That is, the central bank must convince financial markets that the path of future short-term rates will be lower than the path that is currently incorporated in the term structure.

When the zero bound is not a problem, a central bank can convey this message by taking an action—cutting the target rate—and by issuing an accompanying statement indicating whether this action is likely to be temporary or more persistent. Things are more difficult, however, when the zero bound is effective because the central bank can no longer use the target rate as a policy lever to help communicate its intentions.

At the zero bound, central bank statements about future policy actions are likely to play a key role in its ability to lower longer-term rates. Generally speaking, a central bank has a range of options reflecting its willingness to commit to future policy actions and the form of this commitment. For example, a central bank might issue a relatively open-ended statement suggesting that policy will remain accommodative as long as appropriate to stimulate economic recovery. Alternatively,

it can make a more explicit statement about future policy. For example, the central bank might commit to keeping rates low for a specified period of time or until economic growth or inflation reached a specific quantitative target.

The difficult problem faced by a central bank in this situation is that there is likely to be a conflict between its desire to lower rates currently and its desire to maintain flexibility in its future policy options. A more open-ended statement provides a central bank with considerable flexibility in future policy actions. However, it may be less effective in lowering rates now and more prone to a rapid rise in rates if the economy begins to improve faster than expected. This would occur if markets believe that an open-ended policy statement is a signal that the current stance of policy likely to be relatively temporary. In contrast, a more explicit commitment may be more effective in lowering rates now and slowing their future rise.¹⁵ But, if the economy improves much faster than expected, the central bank may regret its longer-term commitment and wish that it still had the option of tightening policy more aggressively.

This discussion suggests that the form of a central bank's commitment strategy and its public statements are likely to be extremely important in its ability to influence long-term interest rates. Indeed, if a central bank chooses an explicit commitment strategy, it is less likely to regret this decision if the strategy is firmly anchored to its longer-run objectives. Thus, for example, a strategy based on an explicit inflation target is likely to be superior to one based on a short-term measure of improvement in economic activity.¹⁶

In summary, when the zero bound restricts a central bank's ability to ease policy by lowering its target interest rate, there may still be considerable scope for a central bank to stimulate the economy by expanding the quantity of bank reserves and by lowering longer-term interest rates. Although the three options discussed above could be effective in principle, there are important practical questions about their effectiveness. In this situation, it may be helpful to look at the experience of central banks in dealing with the zero bound problem.

III. CENTRAL BANK EXPERIENCE WITH THE ZERO BOUND

Historically, hitting the zero bound has been so rare that central banks have little practical experience in conducting policy in this environment. The two most notable examples are the experience of the United States during the 1930s and in Japan over the past decade.¹⁷ In both situations, monetary policy has been perceived as being ineffective in offsetting a prolonged economic slump, and the zero bound has been identified as a key factor limiting the effectiveness of monetary policy.

A closer look at these two episodes suggests that, although the zero bound had a large effect on short-term financial markets, the central bank was able to conduct monetary policy once the zero bound was reached and had some success in lowering long-term interest rates. In both episodes, however, a weakened banking system appears to have reduced the functioning of the reserves channel and so limited the effectiveness of monetary policy.¹⁸

The U.S. experience in the 1930s

Over the years, much has been written about the role of monetary policy in the 1930s and reasons for its apparent ineffectiveness in stimulating economic activity. The predominant view among economists and economic historians is that monetary policy was seriously flawed in both design and execution (Friedman and Schwartz; Meltzer). In particular, the failure of the Federal Reserve to actively ease policy in the face of a massive decline in the money supply has been identified as a key factor in the economic depression from 1929-33. And, the decision of the Federal Reserve to double reserve requirements in 1936-37 was seen as an important contributing factor to the recession of 1937-38.

A second view of the role of monetary policy during the 1930s places relatively more emphasis on limits to the effectiveness of monetary policy in a low interest rate environment, rather than policy errors, as a central problem facing the Federal Reserve during this period. A prominent part of this literature emphasizes that the U.S. financial system may have been stuck in a “liquidity trap” in the 1930s.¹⁹ In this view, the Federal Reserve was unable to lower longer-term interest rates

because financial markets believed that any decline in rates would only be temporary, and bank credit did not expand because banks held excess reserves instead of making loans and purchasing securities. The existence of a zero bound on short-term interest rates may have contributed to the ineffectiveness of monetary policy in this environment.

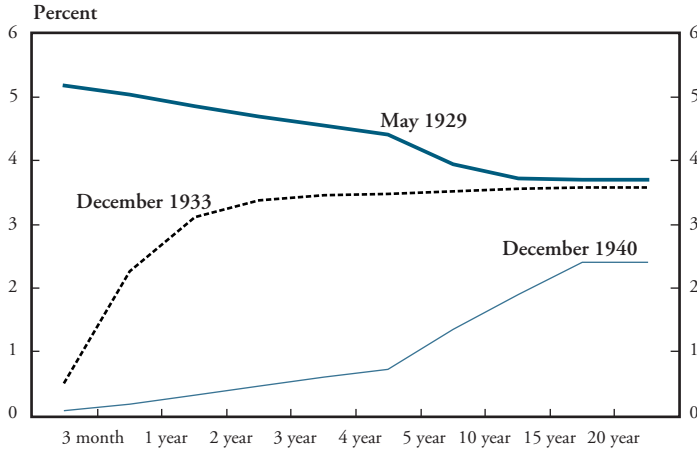
Was there a zero bound problem? To see whether the zero bound posed a problem for the Federal Reserve during the 1930s, it is helpful to examine the behavior of interest rates and financial markets during this period. Although detailed data on interest rates and financial markets are not available for this period, what is known is the federal funds rate fell close to zero in late 1932, and yields on very short-term Treasury securities were near zero and sometimes negative from late 1932 on. Rates on short-term (4-6 month) commercial paper fell from a peak of 6.25 percent in October 1929 to 1 percent in the spring of 1934 and remained at 1 percent or below thereafter.

Not surprisingly, short-term money markets were severely affected. According to Willis, the federal funds market effectively ceased to function from 1933 until the late 1930s, partly because of an excess supply of funds and partly because of concerns about the risks of interbank lending. Similarly, volume outstanding in the commercial paper market fell by 85 percent from the beginning of 1929 to the spring of 1933.

Although short-term interest rates appear to have reached the zero bound by the mid-1930s, Federal Reserve policy does not appear to have been greatly affected. Indeed, narrative accounts of policy discussions and decisions during this period do not suggest any concern by the Federal Reserve that it might not be able to ease policy once short-term interest rates reached zero or that it might need to resort to new methods to implement policy (Chandler; Meltzer).

In light of more recent policy discussions, this conclusion might seem somewhat surprising. It is important to recognize, however, that the Federal Reserve did not use an interest rate target to conduct monetary policy during the 1930s. Instead, policymakers focused primarily on the quantity of reserves provided to the banking system through the discount window and open market operations. Rather than being used as a target, short-term interest rates served as a measure of the stance of monetary policy—that is, whether the Federal Reserve was providing the right amount of reserves to the banking system. Low rates meant

Chart 1
TREASURY CONSTANT MATURITY YIELD CURVE



Source: Cecchetti

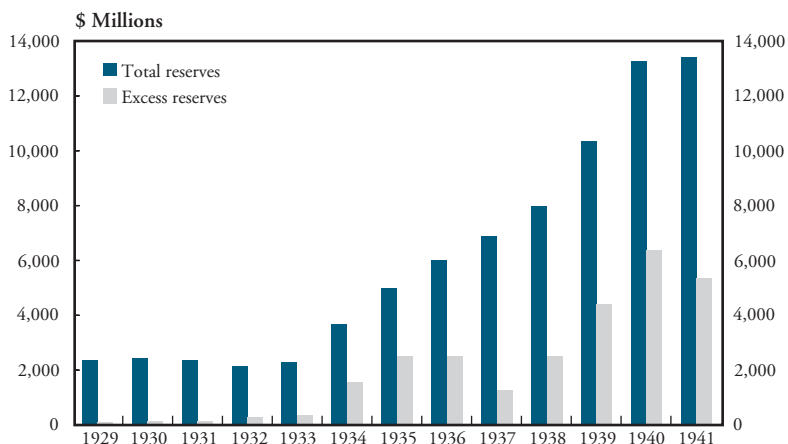
that there was ample reserve availability, while high rates suggested that credit was tight. Put differently, the zero bound was not an important constraint on monetary policy during the 1930s because the Federal Reserve effectively targeted reserves, not interest rates.

Was monetary policy effective? While the zero bound does not appear to have been a constraint on the implementation of monetary policy, this does not imply that monetary policy was effective in the 1930s. As discussed earlier, the key to policy effectiveness at the zero bound is whether alternative monetary policy channels are functioning.

Evidence on the scope and effectiveness of monetary policy during the 1930s is contained in Charts 1 through 6. Chart 1 illustrates the evolution of the Treasury yield curve over this period highlighting three dates: May 1929 (before the stock market crash); December 1933 (after the brunt of the Depression); and December 1940 (prior to the U.S. involvement in World War II).²⁰ In 1929, shortly before the stock market crash, the yield curve was inverted with short-term rates above long-term rates, reflecting tight monetary policy and the expectation that rates would fall in the future. By 1933, short-term rates had fallen considerably, but long-term rates had hardly moved, resulting in an upward sloping yield

Chart 2

RESERVES IN THE U.S. BANKING SYSTEM: 1929-1941



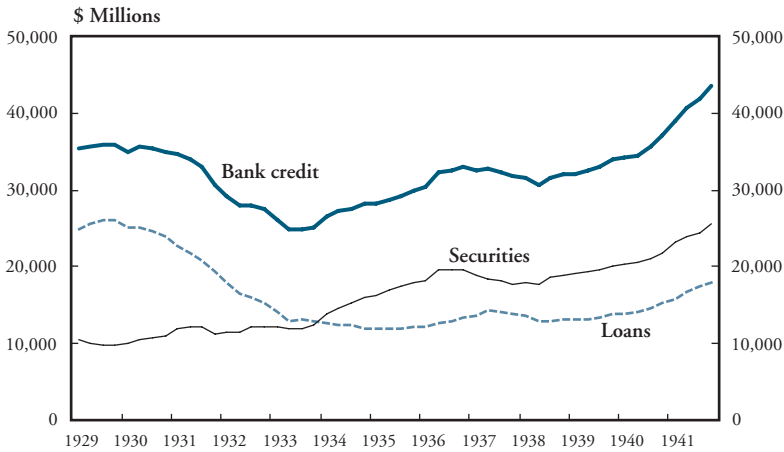
Source: Board of Governors, Banking and Monetary Statistics 1914-41

curve.²¹ Thus, by 1933, while there was very little scope for monetary policy to lower short-term rates because of the zero bound, there was considerable scope to reduce long-term rates by lowering expected future short-term rates. Finally, by 1940, the entire yield curve had shifted down with a considerable decline in medium and long-term interest rates. The obvious question raised by this chart is whether monetary policy contributed to the decline in longer-term rates over this period.

Once the zero bound on short-term rates was reached in 1932-33, Federal Reserve policy became significantly more accommodative as evidenced by a dramatic increase in the quantity of reserves in the banking system.²² Chart 2 shows the behavior of total bank reserves and excess reserves from 1929 to 1941. From 1929 to 1933, total reserves had remained essentially unchanged, despite a collapse in the economy and the money supply, providing evidence that the Federal Reserve failed to actively offset the decline in economic activity during the deepest part of the Depression. After 1933, however, the course of monetary policy changed, and total bank reserves increased dramatically over the next several years.

Chart 3

U.S. BANK CREDIT AND ITS COMPOSITION: 1929-1941



Source: Board of Governors, Banking and Monetary Statistics 1914-41

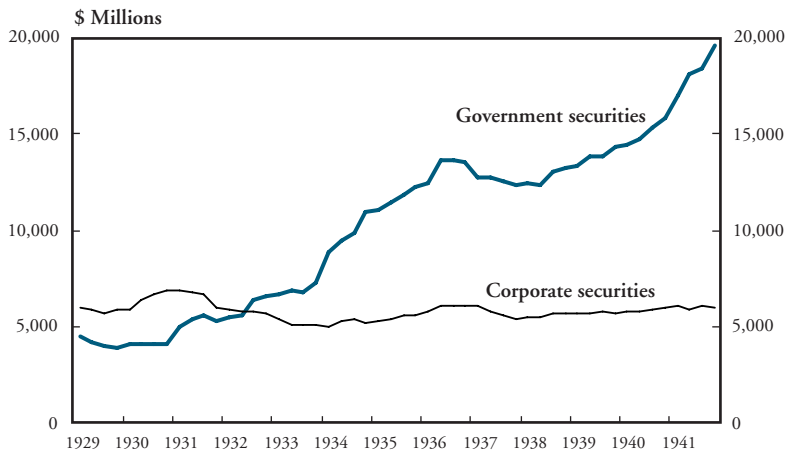
According to the discussion in the previous section, this increase in total reserves should have led to an expansion in bank credit. Indeed, as shown in Chart 3, after falling from 1929-33, bank credit began to expand rapidly until slowed by the increase in reserve requirements in 1936-37. Interestingly, most of the increase in bank credit took the form of bank purchases of investment securities as bank lending remained weak throughout the 1930s (Chart 3). Moreover, a more detailed breakdown of bank security purchases shows that all of the increase took the form of government securities (Chart 4).²³

Although the increase in bank credit suggests that monetary policy provided some stimulus during this period, the size of the increase in bank credit was far smaller than might be expected because banks had greatly increased their holding of excess reserves (Chart 2). Indeed, the increased demand for excess reserves appears to have blunted much of the expansionary effect of monetary policy during this period.

Various reasons have been cited for banks' increased holding of excess reserves. The collapse of the federal funds market and reduced functioning of other short-term money markets may have reduced the ability and incentive of banks to make short-term loans to other financial

Chart 4

BANK HOLDINGS OF GOVERNMENT AND CORPORATE SECURITIES: 1929-1941



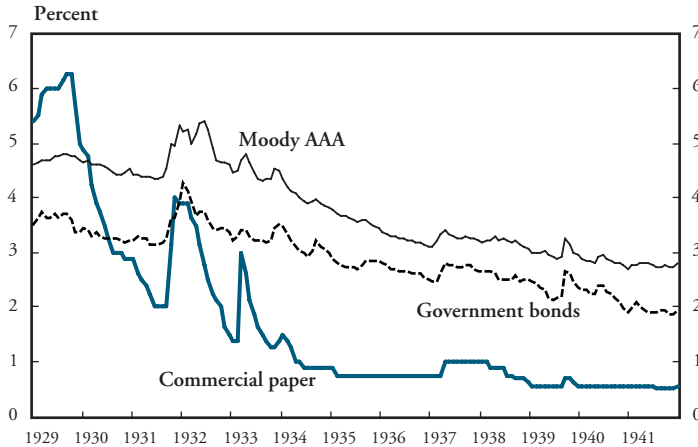
Source: Board of Governors, Banking and Monetary Statistics 1914-41

intermediaries. In addition, the fragile state of the banking system after the wave of bank failures from 1929 to 1933 may have created a desire for greater liquidity by banks in a period of economic uncertainty. Moreover, the weak economy may have reduced the demand for bank loans. Interestingly, at the time, Federal Reserve Governor Eugene Meyer suggested that the failure of banks to use excess reserves to expand bank credit was caused largely by uncertainty about future Federal Reserve policy (Meltzer, pp. 376-77).

The large purchases of government securities by banks helped contribute to the decline in longer-term interest rates on government and corporate securities after 1933 (Chart 5). Thus, yields on government bonds fell from 3.2 percent at the beginning of 1933 to 1.9 percent by the end of 1940. Similarly, yields on AAA corporate bonds declined from 4.4 percent to 2.7 percent over the same period.

The Federal Reserve also altered the maturity of its security portfolio over this period in an attempt to keep long-term rates low. Although policymakers explicitly rejected the idea of targeting or pegging long-term rates, they did adopt a policy of supporting Treasury debt

Chart 5
U.S. INTEREST RATES: 1929-1941



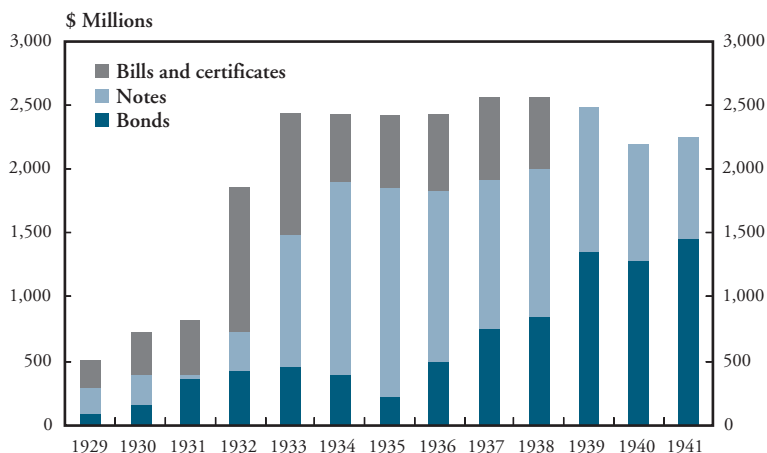
Source: Board of Governors, Banking and Monetary Statistics 1914-41

management operations by buying and selling long-term securities to reduce the volatility of long-term rates (Chandler, pp. 308-10). Over the course of the 1930s, increased purchases of long-term securities coupled with reduced purchases of short-term securities resulted in a significant lengthening of the maturity of the Federal Reserve's security portfolio. Indeed, from late 1933 to the end of 1941, although the overall size of the Federal Reserve's security portfolio was little changed, the proportion of longer-term Treasury bonds rose from 18 percent to 65 percent, and holdings of short-term securities—Treasury bills and certificates—essentially disappeared (Chart 6).

In summary, while short-term interest rates in the United States were near zero for much of the 1930s, the Federal Reserve was not constrained in its ability to implement monetary policy, and there is little evidence that a liquidity trap prevented the use of monetary policy to stimulate economic activity.²⁴ After 1933, the Federal Reserve was able to ease policy by expanding the amount of reserves in the banking system and also increased its purchases of longer-term government securities. These actions led to a rise in bank credit and helped lower longer-term interest rates. At the same time, the increased holding of excess reserves by the

Chart 6

COMPOSITION OF FEDERAL RESERVE'S SECURITY PORTFOLIO: 1929-1941



Source: Board of Governors, Banking and Monetary Statistics 1914-41

banking system underscores the potential difficulties in implementing reserves targeting in a low interest rate environment, especially when accompanied by a weakened banking system.

Japan's experience with the zero bound

A second example of the zero bound can be found in the recent experience in Japan. Since the collapse of the housing and stock market asset price bubbles in the late 1980s, the Japanese economy has experienced a prolonged period of weak economic growth. Over this period, the Bank of Japan has eased monetary policy on several occasions and short-term interest rates have trended lower, reaching zero by the late 1990s.

The U.S. and Japanese experiences with the zero bound show important differences and similarities. In contrast to the U.S. experience in the 1930s, the zero bound has posed greater difficulties for monetary policy in Japan. One reason is that in recent years Japan has implemented policy via an interest rate target. Consequently, a desire to ease policy at the zero bound required a formal change in monetary

policy operating procedures. A second reason is that policymakers in Japan were hesitant to adopt alternative policy procedures either because they doubted the effectiveness of these procedures or because they were reluctant to employ them. An important similarity in the two episodes is the weak condition of the banking system, which appears to have limited the effectiveness of monetary policy in stimulating economic activity.

The nature of the zero bound problem in Japan. In 1995, the Bank of Japan altered its traditional operating procedures based on changes in its discount rate and adopted a formal target for the overnight interest rate. At the time of this change, interest rates were already extremely low, and the initial target for the uncollateralized call money rate was only 0.50 percent. Thus, even in 1995, the Bank of Japan had very little scope for lowering its target interest rate before encountering the zero bound.

As it turned out, however, further policy ease was not required over the next few years as the Japanese economy experienced somewhat stronger growth. The need to ease policy reemerged in the fall of 1998, however, and the Bank of Japan lowered the target rate to 0.25 percent in response to the Asian financial crisis.

The zero bound was first reached in February 1999 when the Bank of Japan lowered its target for the overnight call rate from 0.25 percent to near zero and adopted the so-called “zero interest rate policy” or ZIRP.²⁵ Despite appearances, the zero bound does not appear to have been an important constraint on monetary policy during this period because the Bank of Japan consistently believed that the economic outlook was improving so that further policy easing was not required.²⁶ Indeed, based on an improved economic outlook and concerns about distortions in financial markets caused by the zero interest rate policy, the Bank of Japan tightened policy in August 2000 and raised the target call rate back to 0.25 percent.

The zero bound became a more serious constraint on monetary policy in March 2001 when, in the face of much weaker economic growth and increased deflationary pressures, the Bank of Japan desired to easy policy by more than could be achieved by lowering the target rate back to zero.²⁷ At that point, policymakers were forced to adopt new procedures for implementing monetary policy.²⁸

Alternatives to interest rate targeting at the zero bound. Even though the zero bound was not strictly binding during the “zero interest rate” period, Bank of Japan policymakers did discuss extensively what alternative procedures could be employed if further easing was required.²⁹ Generally speaking, Bank of Japan officials had little confidence that reserve targeting would be an effective alternative, in part, because of the weak condition of the Japanese banking system. In addition, policymakers were also extremely reluctant to engage in large-scale purchases of long-term government securities because it was thought that such actions might jeopardize the Bank of Japan’s recently obtained formal independence and reduce the bank’s credibility in financial markets.

Because of these concerns, Bank of Japan officials relied more heavily on trying to manage market expectations of future policy actions. For example, during the ZIRP, the Bank of Japan committed to maintaining the target rate near zero “until deflationary concerns are dispelled.” By making this commitment, policymakers hoped to reduce long-term rates by lowering market expectations of the future path of short-term interest rates.

This approach was criticized by some as being too vague and open-ended to be effective in lowering long-term interest rates. Specifically, the statement did not formally specify the criteria the Bank of Japan would use in deciding the conditions for terminating the ZIRP.³¹ Thus, the interpretation was left open to financial markets. In fact, financial markets appear to have thought that the policy would only be in effect for a relatively short period of time.³² If so, the ZIRP would not be expected to lead to a significant decline in long-term interest rates.

In March 2001, faced with a weakening economic outlook and evidence of increasing deflationary pressures, the Bank of Japan enacted more radical changes in its monetary policy procedures. Interest rate targeting was abandoned in favor of reserves targeting or “quantitative easing,” and the Bank greatly expanded its purchases of long-term government securities. In addition, policymakers adopted a more explicit commitment to keep interest rates low for an extended period of time.

Since March 2001, despite continuing misgivings about the likely effectiveness of reserves targeting, the Bank of Japan has greatly expanded the amount of reserves in the banking system. From an initial target of 5 trillion yen, over time, the quantitative target for current account balances has risen in a series of steps to 27-32 trillion yen.

The Bank of Japan has also greatly expanded its purchases of long-term government securities.³³ Since March 2001, the purchase of long-term government securities has increased from 400 billion yen to 1.2 trillion yen per month and the proportion of these securities in the bank's portfolio has risen from 64 percent to 70 percent.³⁴

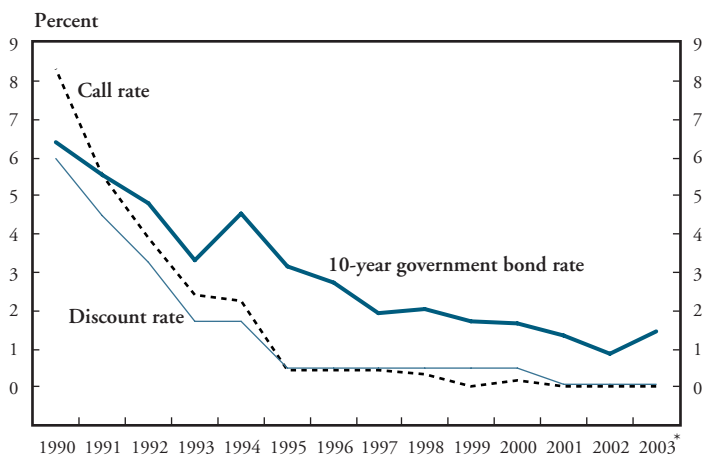
As part of its new operating procedures, the Bank of Japan also adopted a much more explicit statement of the conditions under which the new procedures would be abandoned. The bank indicated that the new procedures would be maintained "until the consumer price index (excluding perishables, on a nationwide statistics) registers stably a zero percent or an increase year on year." Thus, in contrast to the rather open-ended nature of the commitment strategy under the ZIRP, the new statement provided an objective measure that markets could use in forecasting the likely duration of the new procedures. To the extent that this commitment strategy is credible to financial markets, it might be expected to help lower longer-term rates in the near term and to delay an increase in rates when the economy begins to improve.³⁵

Policy effectiveness at the zero bound. As discussed earlier, the effectiveness of monetary policy at the zero bound depends largely on the functioning of the bank reserves channel and on whether there is scope for lowering long-term interest rates. In both respects, the Bank of Japan appears to have faced a very difficult situation. Indeed, as noted above, Bank of Japan policymakers were skeptical that the reserves channel would operate effectively given the weak condition of the Japanese banking system. Following the collapse of stock prices and real estate prices in the early 1990s, the Japanese banking system had experienced a large increase in nonperforming loans that resulted in the failure of a number of banking organizations and left others severely undercapitalized and unable to function effectively.

Moreover, in comparing the recent experience in Japan with the U.S. experience in the 1930s, it is clear that the Bank of Japan has had much more limited scope for lowering long-term rates after reaching

Chart 7

INTEREST RATES IN JAPAN: 1990-2003



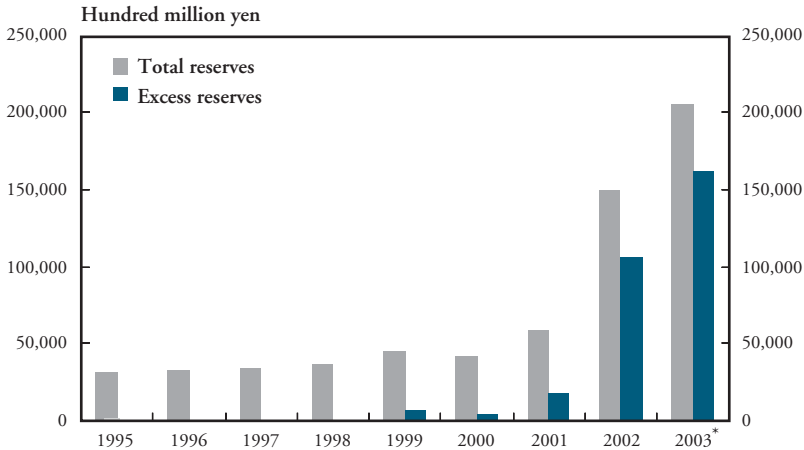
*Through August only
Source: Bank of Japan Statistics

the zero bound (Chart 7). In February 2001, just prior to adoption of the new operating procedures, the interest rate on government bonds was only 1.4 percent.³⁶ Thus, when the zero bound became binding in March 2001, the Bank of Japan had only limited ability to reduce long-term interest rates further, certainly much less than was available to the Federal Reserve in 1933 (Chart 1).

Because the new procedures have only been in effect for 2½ years, it is difficult to judge their overall success. Initially, the procedures appear to have been somewhat successful in lowering long-term rates. Thus, for example, the 10-year government bond rate declined from 1.4 percent in February 2001 to 0.50 percent in June 2003.

More recently, however, the 10-year rate has reversed course and has moved back up to 0.90 percent in July 2003 and to 1.47 percent in August. This recent backup in rates occurred in the context of new information suggesting improvement in economic activity and despite evidence of continuing deflationary pressures. The rise in rates suggests that the more explicit commitment strategy adopted by the Bank of Japan may not be sufficient to keep long-term rates stable once financial markets see signs of improvement in the economy.³⁷

Chart 8
RESERVES IN THE JAPANESE BANKING SYSTEM: 1995-2003



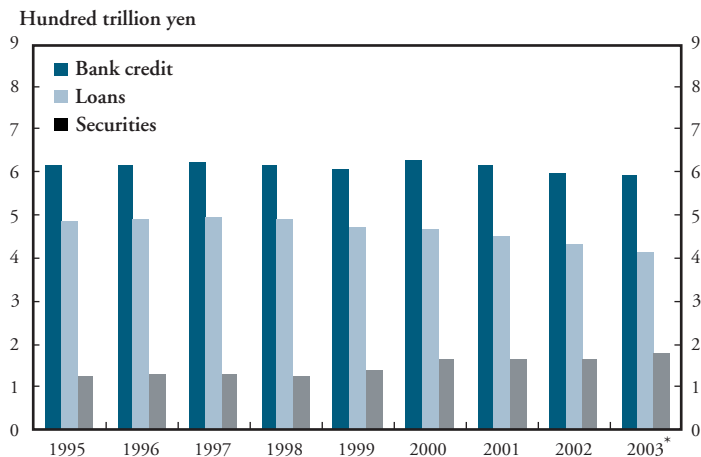
*Through June only
Source: Bank of Japan Statistics

At the same time, the policy of quantitative easing has not led to an overall expansion of bank credit. As discussed earlier, an increased supply of reserves is only likely to lead to an expansion of bank credit if banks are willing and able to make loans and purchase securities. As shown in Chart 8, however, the Japanese banking system has held much of the increased supply of reserves as excess reserves in a pattern similar to that in the United States during the 1930s. While banks have increased their purchases of securities somewhat, a massive contraction in bank lending has led to an overall reduction in bank credit in the period since March 2001 (Chart 9).³⁸ Thus, as compared to the United States experience in the 1930s, Japan's use of quantitative easing has appeared to be less effective.

In summary, Japan's recent encounter with the zero bound has been much more problematic than the U.S. experience during the 1930s. As compared to the United States, the Bank of Japan has had less scope to stimulate the economy by reducing longer-term interest rates once the zero bound was reached. In addition, the stimulus provided through reserve targeting has been muted by ongoing structural problems in the banking system that have led to reduced bank lending.

Chart 9

BANK CREDIT AND ITS COMPOSITION FOR JAPANESE BANKS: 1995-2003



*Through June only
Source: Bank of Japan Statistics

Moreover, the Bank of Japan's efforts to manage financial market expectations via a policy commitment strategy underscore the potential difficulty of relying on this approach. In light of these difficulties, it is important to explore other policy options available to a central bank.

IV. ADDITIONAL POLICY OPTIONS AT THE ZERO BOUND

In a situation like Japan, when reserves targeting is ineffective and when both short-term and long-term rates are near zero, a central bank may need to turn to more "nontraditional" methods of implementing monetary policy. These include: exchange rate depreciation, coordinated monetary-fiscal policy actions, and direct participation by the central bank in financial intermediation. Generally speaking, these alternatives are not first-choice solutions for a central bank either because of concerns about their effectiveness or because they may be seen as violating established principles or best practices for central banks. In a worst-case economic scenario, however, a central bank may not have any other options.

Exchange rate depreciation

One nontraditional approach to the zero bound problem is for the central bank to try to temporarily lower the foreign exchange value of its currency in an attempt to stimulate the domestic economy. While both short-term and long-term interest rates may ultimately run up against the zero bound, exchange rates, like reserves, are not subject to this constraint. A lower value of the domestic currency can stimulate the domestic economy by encouraging exports and may also reduce deflationary pressures by raising the prices of imported goods. Thus, if monetary policy can lower the exchange rate, it may be able to circumvent the zero bound problem.

In general, monetary policy can influence exchange rates in two ways. Because exchange rates are thought to depend partly on interest rate differentials between countries, one approach is for a central bank to ease monetary policy to lower domestic interest rates and thus cause the domestic currency to depreciate. A second approach is to directly intervene in foreign exchange markets by buying foreign currencies and selling the domestic currency to lower the value of the domestic currency.³⁹

The zero bound clearly complicates the use of monetary policy to influence exchange rates since a central bank can no longer lower short-term domestic interest rates to change interest rate differentials. Consequently, it must rely on direct intervention in foreign exchange markets to lower the exchange rate.⁴⁰ Whether intervention is successful in lowering the exchange rate is likely to depend on the size of the intervention and how committed the central bank is seen to be to maintaining a lower exchange rate through future intervention or by keeping monetary policy accommodative for an extended period of time. In addition, the behavior of other central banks will be important. If other central banks do not want their currency to appreciate because of concerns about their domestic economy, they may also ease policy, resulting in an unchanged exchange rate.

Historical evidence on the use of exchange rate depreciation to deal with the zero bound is relatively limited. One situation occurred in Switzerland in the late 1970s when a strong Swiss franc threatened to push the economy into a recession and there was concern about possible deflation. At the time, short-term interest rates were near zero, and

there was limited scope for traditional monetary policy. In this context, the Swiss National Bank used massive foreign exchange intervention in an attempt to lower the exchange rate and stimulate economic activity. Although the policy appears to have been very effective in lowering the exchange rate and increasing economic growth, the large increase in the money supply that accompanied the intervention was associated with significant inflationary pressures in subsequent years (Kugler and Rich).

While a number of economists have recommended that the Bank of Japan pursue temporary exchange rate depreciation as a possible solution to the zero bound problem, the Bank of Japan has been very reluctant to adopt this approach.⁴¹ The bank has suggested that it does not have legal authority for foreign exchange intervention except at the direction of the Ministry of Finance and has also raised a number of concerns about the potential effectiveness of this approach.⁴²

Coordinated monetary and fiscal policy

A second nontraditional alternative to the zero bound problem is to provide a coordinated fiscal-monetary policy stimulus. Normally, when fiscal policy is used to provide economic stimulus, increased government spending is financed by higher taxes or by selling bonds. A disadvantage of both of these financing methods, however, is that they offset some of the economic stimulus provided by the increased spending. Thus, for example, bond finance tends to raise market interest rates, which slows economic activity.

Alternatively, increased government spending could be financed by central bank purchases of government securities. By actively purchasing government debt, the central bank can prevent an increase in market interest rates and so maximize the stimulus provided by the increased spending. In effect, the central bank finances the increased spending by printing money.⁴³

Money-financed government spending may appear to be an attractive option for an economy mired in a severe recession. Most central banks are extremely reluctant to pursue this type of policy, however, because it violates fundamental principles of central banking. Money-financed fiscal policy is inherently inflationary. In the short run, this may not be seen as a problem for an economy like Japan that is stuck in

a deflationary economic slump. Over the longer run, however, a perceived lack of central bank independence could undermine its ability to establish a credible commitment to long-run price stability. The Bank of Japan has strongly resisted suggestions that it should directly finance government spending for these reasons.⁴⁴

Promoting the development of capital markets

A third nontraditional approach to conducting monetary policy at the zero bound focuses on strengthening the monetary policy transmission mechanism by promoting the development of capital markets. Generally speaking, financial intermediation occurs in two ways: through the banking system and through capital markets. Many countries rely heavily on the banking system to provide the bulk of their financial intermediation. Indeed, the United States is one of the few countries where capital markets are sufficiently well-developed to provide an important financing alternative to banks.

When an economy relies heavily on banks to provide financial intermediation, problems in the banking system may lead to a significant decline in financial intermediation with adverse effects on economic activity. In the two historical episodes examined in this article—the United States in the 1930s and Japan over the past decade—the weak condition of the banking system appears to have severely limited the effectiveness of traditional monetary policy. Moreover, in both situations, capital markets were undeveloped and so were not a viable alternative to the banking system.

These episodes stand in sharp contrast to recent experience in the United States where the coexistence of banks and capital markets has allowed financial intermediation to proceed despite problems in one sector. For example, capital markets continued to function during the U.S. banking crisis in the early 1990s. Similarly, the banking system continued to function effectively when capital markets were affected by the Asian financial crisis and Russian debt default in the late 1990s.

This discussion suggests that in situations where traditional monetary policy is limited by the zero bound and the banking system is weak and dysfunctional, policies aimed at strengthening the development of capital markets or even bypassing the banking system may be helpful in

enhancing the effectiveness of monetary policy. Indeed, the Bank of Japan has actively pursued this approach over the past few years.⁴⁵ One way the Bank of Japan has attempted to spur the growth of capital markets is by progressively relaxing restrictions on eligible collateral for its open market operations. For example, the Bank has tried to improve the marketability of private securities and the depth of financial markets by expanding the list of eligible collateral for repurchase agreements to include commercial paper and asset-backed securities.

More recently, the Bank of Japan has gone even further to implement nontraditional policies aimed at stabilizing the financial system and supporting the development of capital markets. One of the more controversial policies has been its decision to purchase stocks held by commercial banks in an attempt to reduce the effects of stock market volatility on bank capital and earnings (Bank of Japan, 2002a). As of July 2003, the Bank of Japan had purchased 1,505.9 billion yen worth of stocks held by commercial banks. In addition, the Bank of Japan has established a program for the outright purchase of private sector, asset-backed securities (Bank of Japan, 2003a). In effect, the Bank has decided to bypass the weak banking system by stepping in to provide financing directly to the private sector. Such policies are a considerable departure from standard central bank practices of purchasing only government securities and no doubt reflect the severity of the banking crisis in Japan.

V. SUMMARY AND CONCLUDING COMMENTS

This article has examined how the zero interest rate bound is likely to affect the implementation of monetary policy. One principal conclusion to be drawn from the analysis is that the zero bound should not be viewed as an insurmountable problem for central banks. Even when short-term interest rates are near zero, a central bank can continue to ease policy by expanding bank reserves and typically has a number of methods available to lower longer-term rates. And, in the event that all interest rates are near zero or the banking system is dysfunctional, a variety of nontraditional policy options may be available. At the same time, all of these alternatives come with associated costs and difficulties and, to be effective, require a central bank to communicate effectively with financial markets and the public.

If the zero bound is not a particularly serious problem, there must be an alternative explanation for the limited effectiveness of monetary policy in the United States in the 1930s and in Japan more recently. The analysis presented in this article suggests a key factor common to both episodes was a weakened banking system that reduced the effectiveness of the monetary policy transmission mechanism. In this situation, there may be limits to what monetary policy can be expected to accomplish even in the absence of difficulties posed by the zero bound, and a central bank may need to rely more heavily on nontraditional policy approaches.

Finally, the analysis presented in this article suggests that the zero bound is unlikely to pose serious difficulties for Federal Reserve policy in the current U.S. economic environment. With the federal funds rate target at 1 percent, the Federal Reserve still has some scope for further policy ease before the zero bound is reached. Moreover, should short-term rates hit zero, there is still considerable scope for lowering longer-term interest rates. And, with a healthy banking system and capital markets, the monetary transmission mechanism should function effectively. In this environment, whether monetary policy is effective in stimulating economic activity will likely depend more on whether households and firms respond to the lower cost and greater availability of credit than on the particular way the Federal Reserve implements policy. Indeed, given the important role of policy expectations in the monetary policy transmission process, the biggest challenge facing the Federal Reserve at the zero bound is likely to be the effective communication of its zero bound strategy to financial markets and the public.

ENDNOTES

¹While a negative nominal rate may not appear possible, in practice yields on short-term Treasury securities were negative during much of the 1930s and negative yields have recently been observed for overnight loans in Japan. The existence of negative yields appears to be due to institutional features that do not function in normal circumstances. For example, Cecchetti argues that negative yields in the United States in the 1930s were largely due to institutional features of Treasury debt management.

²One way of seeing the difference in information required is to consider how monetary policy would be implemented in a textbook IS-LM model. In this framework, reserves targeting involves positioning the LM curve along the IS curve to achieve the desired interest rate/real output combination. This requires knowledge of money demand and bank reserves demand, which help determine the position of the LM curve, and the IS curve. In contrast, interest rate targeting only requires information on the IS curve.

³Some evidence in support of this point can be found in the behavior of financial markets during the period from 1979 to 1982 when the Federal Reserve used a nonborrowed reserves operating target rather than a federal funds rate target. This period was characterized by a large increase in the volatility of both short-term and long-term interest rates. This increased volatility may have been due, in part, to greater difficulty of financial market participants in judging the likely path for future short-term rates under reserves targeting.

⁴Ordinarily, these limits are unlikely to be encountered. There is some evidence that they may have been important in the United States in the early 1930s. It has been argued, for example, that restrictions on eligible assets may have limited discount window lending and that open market operations may have been limited by collateral restrictions for Federal Reserve notes. For a discussion, see Chandler (pp. 225-33 and pp. 182-91). The issue reemerged more recently a few years ago when forecasts of budget surpluses and a declining supply of government securities raised concerns about whether the Federal Reserve might run out of eligible assets to conduct open market operations.

⁵In practice, the federal funds market could see reduced activity or cease to function before the funds rate reached zero. Since there are transactions costs associated with brokering activity, this activity could become unprofitable with a funds rate somewhat above zero. In addition, because federal funds transactions are generally uncollateralized, activity would likely cease once the return from lending funds no longer covered the potential credit risk of the transaction.

⁶The zero bound could also pose some technical problems for a central bank in providing reserves via repurchase agreements. For example, because of reduced functioning of overnight markets, the central bank could experience difficulty in achieving its desired amount of reserve provision. In this event, the central bank might need to switch from repurchase transactions to outright purchases of securities in conducting open market operations. More generally, to the extent that the behavior of depository institutions and the public were to change in a zero interest rate environment, a central bank might experience greater difficulty in determining the appropriate amount of reserves to supply.

⁷Depository institutions are also subject to cost pressures to the extent lower interest rates reduce interest margins. However, at very low interest rates deposit insurance may make bank deposits more attractive.

⁸This figure is a simplification designed to illustrate the point that a central bank can alter bank reserves even if short-term rates cannot be lowered further because of the zero bound. In the more general situation when the zero bound is not effective, reserves and short-term interest rates are jointly determined.

⁹These additional options include using monetary policy to influence exchange rates, pursuing coordinated fiscal and monetary policy, and attempting to improve the functioning of financial markets and institutions. One possible channel that is not discussed in this article is the possibility monetary policy may influence the economy via wealth effects on consumer spending. Although wealth effects may be an important factor influencing the behavior of the economy in a low interest rate environment, particularly if an economy is experiencing goods or asset price deflation, their quantitative significance is unclear, and they are unlikely to be a reliable channel through which monetary policy might operate.

¹⁰Because of concerns about potential interest rate risk, banks will tend to purchase short to medium-term securities rather than longer-term securities. However, as bank security purchases push down short-term and medium-term rates, other investors will have incentive to increase the maturity of their investments, which should help lower longer-term rates.

¹¹It should be noted that under this procedure, a central bank would not necessarily need to purchase large amounts of securities, as it would only make purchases if market rates threatened to move above the ceiling rate.

¹²For a more detailed discussion of these issues in the context of the U.S. experience during and after World War II, see Hetzel and Leach.

¹³A more detailed technical discussion of the role of monetary policy expectations in the context of the zero bound can be found in Eggertsson and Woodford.

¹⁴The yield curve also contains term or liquidity premia that would normally give an upward slope to the yield curve even if monetary policy was expected to be unchanged. These premia are generally thought to be relatively small and to vary over time. While some economists believe that the behavior of these premia might be influenced by monetary policy, their behavior is not well understood, and they are not discussed in this article.

¹⁵As discussed above, this would only occur if the markets' interpretation of the commitment statement suggested a lower path for future short-term rates.

¹⁶For a more complete discussion of the role of expectations and policy commitment in dealing with the zero bound, see Eggertsson and Woodford.

¹⁷A somewhat less prominent example is the case of Switzerland in 1978-79 where the Swiss National Bank briefly encountered the zero bound. This case is discussed very briefly in the fourth section of this article. For a more indepth discussion, see Kugler and Rich.

¹⁸In these episodes, the Federal Reserve and Bank of Japan have also been criticized for errors in decision making and in implementing policy. This article does not consider these issues directly and focuses on whether policy actions, when taken, were effective.

¹⁹Discussions of a possible “liquidity trap” in the United States during the 1930s were prominent in most macroeconomic textbooks of the 1950s and 1960s. The classic treatment of the issue is in Brunner and Meltzer. The term “liquidity trap” had essentially disappeared from textbooks and the economics lexicon until revived in Krugman’s recent discussion of Japan.

²⁰These estimates of the yield curve are found in Cecchetti.

²¹The shape of the yield curve suggests that rates were expected to rise significantly over the next two years, suggesting an economic rebound. In fact, on an annual basis, real GDP showed strong growth over the next four years.

²²One of the more interesting aspects of this increase in reserves is that it occurred not through open market operations or increased discount window lending but through inflows of gold into the United States after the United States raised the price of gold in 1934. Discount window lending was negligible because the discount rate was above market rates, and the overall size of the Federal Reserve’s security portfolio was little changed during this period. For a more detailed discussion, see Meulendyke (pp. 30-33) or Chandler (p. 244, pp. 296-304).

²³For additional discussion of these developments, see Chandler (p. 259).

²⁴Brunner and Meltzer’s classic treatment found little evidence of a liquidity trap. More recent studies come to a similar conclusion. See, for example, the papers by Hanes and by Orphanides.

²⁵This policy had two elements. First, the Bank of Japan conducted open market operations to maintain a target rate near zero. Second, the Bank of Japan attempted to lower longer-term interest rates by managing financial market expectations of future policy actions. It did this by committing to keep the interest rate target near zero until “deflationary concerns were dispelled.” For a more detailed discussion, see Oda and Okina.

²⁶This point is noted by Oda and Okina (p. 324) and by Orphanides (p. 14) and is clearly reflected in the published record of the Bank of Japan’s Monetary Policy meetings during this period.

²⁷A case can be made that the “prospect” of hitting the zero bound may have constrained policy much earlier than the March 2001 date used in this article. In particular, the Bank of Japan may have wished to ease policy by more than the 50 basis points available during the Asian financial crisis in 1998 and may have refrained from doing so because of the need to adopt new operating procedures.

²⁸The zero bound has had some impact on the functioning of short-term money markets in Japan, especially in the overnight market, where volume has dropped significantly and most lending is now collateralized. In addition, money market fund balances have declined but this has generally been attributed more to concerns about credit quality in one type of money fund than to low interest rates. Volume in the commercial paper market has expanded somewhat, but this is likely a result of attempts by the Bank of Japan to support the development of capital markets as discussed later in the article.

²⁹These discussions can be found in the minutes of the bank’s Monetary Policy meetings available on the Bank of Japan’s website, and a good summary can be found in Oda and Okina.

³⁰The Bank of Japan was formally granted operational independence in 1998.

³¹The statement does not specify the likely timeframe or the criteria for deciding when to change policy. In fact, policymakers at the Bank of Japan tended to rely on measures of economic activity, such as the growth of private demand, rather than measures on inflation in deciding to end the ZIRP in August 2000.

³²Evidence that markets believed that the ZIRP would be short-lived can be found in forward interest rates. As noted by Oda and Okina, financial markets consistently believed that the policy would last no longer than a year ahead. Thus, according to the expectations theory of the term structure, there should be little effect on long-term rates.

³³Prior to the change in operating procedures, the Bank of Japan had limited its monthly purchases of long-term securities to an amount equal to the growth in its outstanding currency liabilities. After the change in procedures, the scope for securities purchases was expanded by setting an upper limit for the total stock of securities based on the outstanding stock of currency liabilities. Because holdings of long-term securities were well below this ceiling at the time of the change, the amount of securities that could be purchased in the short run was greatly expanded.

³⁴In official statements, the Bank of Japan has emphasized that the role of increased purchases of long-term government securities has been to augment its efforts to expand reserves, especially in situations where short-term repurchase operations were not able to meet reserve objectives. The bank has been explicit that these purchases are not designed to support prices of government securities or finance government spending. Regardless of motivation, however, these purchases should contribute to lower long-term rates.

³⁵While the more recent commitment strategy appears to be superior to the previous one, a number of commentators have suggested that the Bank of Japan needs to go much further and adopt an explicit inflation targeting or price level targeting framework (Svensson, Bernanke). The current approach used by the Bank of Japan is clearly temporary, and there may be considerable uncertainty in financial markets about how policy would be implemented once deflation has been overcome as measured by the core CPI. An inflation targeting or price level targeting framework would remove this source of uncertainty about future policy and, as a practical matter, would likely result in an easier policy stance for a longer period of time since the inflation target would presumably be set above zero. One concern that has been raised about the effectiveness of inflation or price level targeting in the Japanese situation is whether the introduction of such a framework would be seen as any more credible by financial markets than other attempts to manage expectations.

³⁶In January 1999, just prior to the start of the ZIRP, the 10-year Japanese government bond rate had already fallen considerably, from a peak of over 6 percent in 1990 to less than 2 percent. Over the duration of the ZIRP, the 10-year rate was essentially unchanged.

³⁷In recognition of this difficulty, the Bank of Japan has recently attempted to clarify the conditions under which the policy of quantitative easing might be ended (Bank of Japan 2003c). Two necessary conditions are that the core inflation rate remains above zero for a period of months and that the Bank does not anticipate a resumption of deflationary pressures. Even if these conditions are met, however, the Bank indicated that it might continue to maintain the policy.

³⁸Bank lending has continued to decline even after adjusting for write-offs of nonperforming loans (Bank of Japan 2003b, Chart 37).

³⁹Intervention to lower the exchange rate results in an increase in domestic bank reserves and the money supply. The central bank can allow the expansion of reserves and money supply to occur or it can “sterilize” the intervention by selling securities in an open market operation to neutralize the reserve effects. Most studies find little effect of sterilized intervention on exchange rates. That is, intervention does not appear to influence exchange rates unless accompanied by a change in domestic monetary policy or the expectation that policy will change in the future. One recent study by Fatum and Hutchinson does suggest that sterilized intervention by the Bank of Japan has measurable effects on the exchange rate, but only over very short periods of time.

⁴⁰The use of intervention when the zero bound is reached would almost certainly be unsterilized since the central bank would likely want the stimulative effects of reserve growth to occur. Sterilizing the intervention in this situation would lead to a sale of government securities that would raise longer-term interest rates offsetting some of the effects of the intervention. In some respects, exchange rate depreciation through unsterilized intervention is analogous to a policy of direct purchases of long-term government securities. In each case, there is a direct effect on asset prices via purchases of assets that is accompanied by a quantitative effect through increased bank reserves.

⁴¹The most well-known proposal is by Svensson.

⁴²See, for example, the discussion in Oda and Okina (p. 338 and pp. 347-48). More recently, in November 2002, the Japanese Ministry of Finance requested that the Bank of Japan refrain from sterilizing foreign exchange intervention, in part, to signal to financial markets that a lower value of the yen was desirable. Members of the Bank’s Policy Board indicated that under the “quantitative easing” approach the distinction between sterilized and unsterilized intervention was immaterial because the Bank was already oversupplying reserves to the banking system, and members were reluctant to tie changes in the quantitative reserves objective directly to the amount of intervention (Bank of Japan 2002b).

⁴³This approach can also be viewed as a combination of fiscal policy and a monetary policy that pegs interest rates on government securities as discussed in the second section of this article.

⁴⁴See, for example, the discussion in Oda and Okina (pp. 341-47).

⁴⁵This can be viewed as a way of reducing the so-called “external finance premium,” a feature of imperfect capital markets that raises borrowing costs. For a discussion, see Gertler.

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