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during 2007-2009 and the Bank of Japan during
1998-2006**

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**Non-Traditional Monetary Policies: G7 Central Banks
during 2007-2009 and the Bank of Japan during 1998-2006***

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Abstract

This paper offers a brief summary of non-traditional monetary policy measures currently adopted by G7 central banks and their provisional evaluation in the light of the Bank of Japan (BOJ)'s experience during the period of 1998-2006. The paper points out that although unprecedented measures seem to have been adopted by major central banks since 2007, many of them have been tried in one way or another in earlier episodes of financial crises, especially by the BOJ during 1998-2006 and are in this sense not new. We summarize the BOJ's and G7 central banks' policies based on a typology of policies that can be used even when interest rates are very low. Non-traditional policy measures can be classified into managing interest rate expectations, targeted asset purchases and quantitative easing, all of which were used by the BOJ. The so-called credit easing can be considered to be a part of targeted asset purchases. In the current episode, targeted asset purchases or credit easing has been employed by most central banks, while expectations management and (strong forms of) quantitative easing have not been widely used. We explore reasons for such a choice of policy strategy in the current period. In addition, some important lessons can be learned about the effectiveness of non-traditional policies from what the BOJ and the Japanese government did and did not do during the early to mid 1990s and its ultimate failure to avoid deflation.

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Responding to the severe global financial and economic crisis since the summer of 2007, central banks around the world have been engaging in the so-called non-traditional approaches to stimulate the economies and address problems in the financial system. This paper offers a brief summary of the measures adopted and a provisional evaluation thereof in the light of the Bank of Japan (BOJ)'s experience during the period of 1991-2006.

The major thrust of the paper is a very simple one; although unprecedented measures seem to have been adopted by major central banks since 2007, many of them have been tried in one way or another in earlier periods of financial crises, especially by the BOJ during 1998-2006 and are in this sense not new.

In discussing similarities between the measures adopted by the BOJ during 1998-2006 and those that are currently adopted, we emphasize the dual objectives for which the measures are expected to serve; one, the stability of the prices of goods and services and, the other, the stability of the financial system. Central banks normally attempt to separate the two types of operations. Liquidity provision to keep the policy interest rate at target is inherently different from a last resort lending to financial institutions in financial crises. As we argue, however, at times of severe financial stress it becomes very difficult to clearly determine which purpose each policy measure is serving for. This problem becomes especially serious when interest rates fall to levels close to zero.¹ In this sense the analysis of the Japanese experience, where the policy rate has been nearly zero for almost 15 years, sheds an interesting light on the relationship between monetary policy and prudential policy as practiced by central banks.

In the following we first summarize the experience of the BOJ since the early 1990s. We briefly discuss the macroeconomic background that forced the BOJ to lower the policy rate to near zero levels by the mid 1990s. We then point out that the financial crisis of 1997-1998 and the emergence of strong deflationary forces in the economy led the BOJ to adopt non-traditional monetary policy measures during 1998-2006. In section 2 we offer a typology of non-traditional monetary policy measures that can be adopted when nominal interest rates are very low. Non-traditional policy measures can be classified into managing interest rate expectations, targeted asset purchases and quantitative easing. The so-called credit easing can be considered to be a part of targeted

¹ There is a related, but different problem of whether financial stability issues should be taken into account in determining the level of the policy interest rate. In this paper we will not discuss this issue in detail. See, for example, Curdia & Woodford (2009).

asset purchases. We point out that the BOJ adopted most of these conceivable measures. In section 3 we reconsider the policy measures adopted by the BOJ as those designed to contain stresses in the financial system, thus emphasizing the dual nature of the purpose for which they are expected to serve. In section 4 we summarize the existing empirical evidence on the effectiveness of the measures adopted by the BOJ.

In section 5, using the typology presented in section 2, we review monetary policy measures recently adopted by G7 central banks. Most of the measures currently adopted may be seen to be essentially the same as those adopted by the BOJ in earlier years. There have been, however, differences in focus. Targeted asset purchases or credit easing has been employed by most central banks, while expectations management and quantitative easing have not been widely used. In section 6 we explore reasons for such a choice of policy strategy in the current period. The section also argues that an appropriate comparison between the BOJ policies in earlier years and current policies of the G7 central banks should include the early to mid 1990s, when the BOJ lowered rates successively to zero. It appears that we can draw some important lessons from what the BOJ did and did not do during that period, the early to mid 1990s, and its ultimate failure to avoid deflation.

1, The Bank of Japan's Monetary Policy during 1992-2006²

Let us first review the macroeconomic situation of the Japanese economy during the early to mid 1990s as a background for the monetary policy discussion in later periods. Stock and land prices soared to their peaks in 1990, giving way subsequently to a decade long correction process. Declining asset prices hit the banking system severely. Public money, bank earnings and bank capital amounting to about 20% of GDP were used to address the bad loan problem. Severe de-leveraging by non-financial firms produced a long period of weak business fixed investment. The economy grew at a minimal 1.0% rate on average during 1992-2002, the so-called "lost decade". The weak economy affected general prices as well and the CPI inflation went into negative territory in 1998. The BOJ started to ease in the summer of 1991, and then lowered the call market rate by almost 800 basis points in the following four years, bringing the rate to below 0.5% in the summer of 1995.

As a result, the BOJ had little room for further reductions in interest rates already in 1995. Roughly speaking, the economy has been in a liquidity trap since then. The BOJ maintained the uncollateralized overnight call rate, the operational target of policy

² This section draws on Ueda (2005).

since the mid 1990s, as low as approximately 0.5 % from September 1995 through September 1998 to stimulate the economy and to contain the emerging strains in the financial system. The financial strains became even more serious in the fall of 1998 and the BOJ cut the rate to 0.25% in September 1998. Despite this, the CPI inflation rate moved into negative territory in the second half of 1998. The weakness in the economy, financial stresses and the call for further monetary easing did not dissipate. The BOJ then successively lowered the overnight call rate to virtually zero in February and March of 1999. During late March in 1999, the overnight call market rate was at 0.03% and the rate had literally hit the zero lower bound on nominal interest rate (ZLB).

The BOJ continued its exploration for further easing measures. The so-called zero interest rate policy (ZIRP)—the core of the BOJ’s monetary policy since 1999-- was introduced in April 1999. The ZIRP was not just a zero short-term interest rate, but a commitment to maintain it until a pre-announced condition was fulfilled. Specifically, the BOJ announced in April 1999 that the Bank would continue the zero interest rate “until deflationary concerns were dispelled”.

In August 2000, the BOJ lifted the ZIRP and raised the overnight call rate to 0.25 %, since the economy was recovering and showing some signs of overcoming deflation. In late 2000, however, the economy, reflecting a global decline in the demand for high tech goods, began to deteriorate. This raised deflationary concerns again. The BOJ lowered the policy interest rate to 0.15 % in February 2001, and then adopted the quantitative easing policy (QEP) in March 2001. The QEP consisted of three pillars. First, the BOJ maintained an ample liquidity supply by using the current account balances (CABs) at the BOJ as the operating policy target. Second, the BOJ committed itself to maintaining the provision of ample liquidity until the rate of change of the core CPI (nationwide, excluding perishables) becomes zero percent or higher on a sustained basis. Third, the BOJ increased the amount of purchases of JGBs from time to time as a tool for liquidity injection. It was projected that increasing the CAB targets beyond the level of the required reserves would normally keep the call rate near zero percent.³ Thus, with the commitment to maintain ample liquidity provision until deflation ended, the QEP contained a version of the ZIRP. Viewed in this way, the QEP can be regarded as consisting of ZIRP and liquidity provision beyond levels necessary for a zero rate that relied partially on purchases of long-term government bonds.

The target on the CABs were increased from approximately 5 trillion yen at the

³ In fact, the uncollateralized overnight call rate declined to a minimum of 0.001 percent, during the QMEP period, while it declined to at most 0.01 percent during the ZIRP period.

introduction of the QEP in March 2001, an amount roughly 1 trillion yen greater than the then-required CABs, to a range of approximately 30-35 trillion yen in January 2004. The increases in CABs were achieved mainly by market operations, including the BOJ's purchases of JGBs. The amount of JGB purchases was 0.4 trillion yen per month in March 2001 and was gradually increased to 1.2 trillion yen by May 2004. The QEP was finally lifted in March 2006.

2, Typology of Policy Options near the ZLB

Bernanke & Reinhart (2004) classify policies at the ZLB into three types. They are: (i) shaping or managing interest rate expectations—that is, providing assurance to the market that policy rates will be lower in the future than currently expected; (ii) changing the composition of the central bank's balance sheet in a way the central bank's holdings of non-traditional assets increase (targeted asset purchases); and (iii) expanding the size of the central bank's balance sheet beyond the level required for a zero policy rate (Quantitative Easing: QE) This is summarized in Table 1.

In order to clearly differentiate between (ii) and (iii), it would be useful to think of (iii) as an attempt to expand the balance sheet by purchases of traditional assets, say, treasury bills. Then, an expansion of a central bank balance sheet on purchases of non-traditional assets is a combination of (ii) and (iii). Strong forms of quantitative easing are accompanied by a target on a measure of central bank balance sheet or quantity of money.

Woodford (1999) was one of the first to state the rationale for strategy (i). He argued that “it is unlikely that monetary policy can do much to loosen the constraint imposed by the zero bound, except by changing what people expect policy to be like after the constraint ceases to bind.” In other words, central banks can affect today's medium- to long-term interest rates by promising a longer period of a zero rate than is currently assumed by the market. Similarly, Reifschneider and Williams (2000) studied what a central bank can do in a low inflation environment and showed that it can do better than, say, simply setting the short rate at the larger of the Taylor rule or zero. That is, it can deliver more economic stability by promising, following a period of deflation and a zero rate, to maintain a zero rate for a while even after the Taylor rule rate became positive.

There are at least two ways to justify strategy (ii). First, we may simply argue that changing relative asset supplies in the market leads to asset price changes, which in turn affect aggregate demand for goods and services. For example, buying long-term

government bonds may affect long-term interest rates, and buying foreign exchanges may affect exchange rates, etc. Whether such effects are in fact present is an old question in monetary economics and is an unsettled empirical matter.⁴

A second way to justify targeted asset purchases would be to consider a situation where market liquidity and, as a result, asset prices in certain segments of the financial system decline sharply during a severe financial crisis. Central banks may be able to mitigate the problem by buying the assets or lending against them. Theoretical justification for such an operation is provided, for example, in Allen and Gale (2007) and Kiyotaki and Moore (2009). Thus, this category may be broadened to include not just outright purchases of assets but also central bank liquidity provision against them or purchases under repo agreements. This justification of strategy (ii) may be close to what people have in mind when they use the phrase “credit easing.”

The definition of strategy (ii) is a loose one. Some central banks buy long-term government bonds and many lend against private IOUs even under normal times. In order to qualify in this category some of the following seem to be necessary: assets purchased are regarded as non-traditional; the asset market in question is temporarily dysfunctional by lack of risk taking.⁵

There does not seem to be a consensus on the rationale behind strategy (iii). Bernanke and Reinhart (2004) discuss three possible channels: (a) the portfolio rebalancing effect, whereby increases in the monetary base would lead the private sector to rebalance its portfolios, lowering yields on alternative, non-monetary assets; (b) altering expectations of the future path of policy rates by a visible act of setting and meeting a high reserve target; and (c) the expansionary fiscal effect, whereby the central bank replaces public holdings of interest-bearing government debt with non-interest-bearing currency or reserves, thus replacing the expected future tax liability for the public with an inflation tax. For channel (c) to produce meaningful effects, the growth rate of base money, however, has to be unusually high. Also, the liquidity supplied will have to be in the economy permanently. Otherwise, there will be a period of negative seigniorage growth. Theoretical rationale behind channel (a) is not obvious

⁴ Even if they are effective, there remains the question of who should carry them out. Decisions on interventions in the foreign exchange market are made by finance ministry in many countries. The fiscal authority can also change the maturity structure of government debt and potentially generate similar effects on interest rates to those generated by central bank operations in government bonds. See, for example, McCauley and Ueda (2009).

⁵ To take a broadest view of this category, lending to entities a central bank normally do not lend to against even traditional assets may be considered non-traditional and included in this group.

if, for example, base money is supplied in exchange for treasury bills with a zero rate; the transaction is an exchange of two very close substitutes. At this point, however, it seems fair to say that we need to wait for evidence for/against the presence of such a channel and then to think more hard theoretically about why that is so.

In addition to the above three strategies, some have argued for guiding short rates into negative territory.⁶ This would generate obvious effects on the economy. Beyond a certain point, however, this strategy will require taxing currency. The practical and socio-psychological difficulties involved seem daunting.

In passing we may note that all three strategies may be adopted at positive levels of interest rates. For example, regarding strategy (i), the Fed used a version of it during August 2003 to December 2003, when the federal funds rate was one percent, by stating that “the committee believes that policy accommodation can be maintained for a considerable period. Strategy (ii) can easily be seen to be also used under positive interest rates. Even strategy (iii) can coexist with positive interest rates if interest is paid on excess reserves.

The BOJ can be seen to have adopted all three of the strategies as summarized above. Both the ZIRP and the ZIRP element of the QEP are examples of strategy (i). The expansion of the CABs at the BOJ in the QEP period is an example of strategy (iii). (See table 2.) Under appreciated is the BOJ’s extensive use of strategy (ii), to which we now turn.

3, Targeting Soft Spots in the Financial System: The BOJ’s Case

During the years 1998-2006 liquidity and risk premiums rose in many parts of the Japanese financial system. The rise in premiums led to a sharp contraction in economic activity in late 1998. Similar stresses were felt in 2001 and 2002. As a result, many of the BOJ’s operations attempted to target “soft spots” in the channels of financial intermediation in order to contain the stresses or the rise in risk premiums. In fact, all of strategies (i)-(iii) can be used to contain such rise in risk premiums.

For example, since the credit crunch of 1998, the BOJ expanded its fund-providing operations using commercial papers (CPs) as collateral (strategy (ii)). This move is believed to have added to the liquidity of the CP market and, in turn, led to declines in issuing costs of CPs. In addition, the BOJ had started to accept as collateral Asset Backed Securities (ABSs) for its fund supplying operation since October 1999. In the spring of 2003 the BOJ went further by its decision to purchase Asset Backed CPs

⁶ Riksbank has set the rate on private bank deposits at -0.25% since late July 2009.

(ABCPs) and ABSs outright (again, strategy (ii)). This reflected the BOJ' perception that the markets for these instruments were still in their infancy and that they would develop further by some risk taking by the BOJ. The development of the market would allow participation of a wider range of investors and ultimately result in declines in fund raising costs for borrowers and, at the same time, in easier unloading of loans by financial institutions. Separately, the BOJ had established a standby scheme that allowed banks to sell equities they held to the BOJ since December 2002. This again was a measure to target a soft spot in the financial system, i.e., banks' vulnerability to declines in stock prices. Banks could certainly sell stocks in the market. Given the then low liquidity of the market, however, banks may have been reluctant to sell stocks and lower prices themselves.

Even operations under strategy (iii) had an element of strategy (ii). In its pursuit of QEP, the BOJ increasingly had to lend long in the money market. This was because finding borrowers paying positive interest rate became difficult at short maturities. As of April 2001, the start of the QEP period, fund supplying operations had maturities of one to three months. In March 2005, some operations were of 11 month maturity. In these operations the BOJ was taking, to varying degrees, the credit risk of counterparties or of issuers of instruments traded, as explained above. At times of severe financial stress, private financial institutions may lend to each other for very short periods, say, days, but may be reluctant to do so for longer periods. Such long-dated operations by the BOJ then may have had the effect of containing term premiums.

Even Strategy (i) was considered useful for easing stresses in the financial system. When obtaining liquidity becomes difficult at the overnight horizon, the overnight rate cannot stay at zero. Thus, the promise by a central bank to keep the overnight rate at zero amounts to an assurance by a central bank of the availability of short-term liquidity during the period of the promise, leading to the easing of liquidity concerns of financial institutions.

To summarize, most of the measures adopted by the BOJ during 1998-2006 were designed to mitigate the stresses in the financial system as well as to fight deflationary forces in the economy. Among others various elements of Strategy (ii) were used for this purpose. We may also point out that most of the operations under strategy (ii), with the exception of purchases of ABS, were designed to ease problems the banking sector was facing. This certainly reflected the bank centered nature of Japan's financial system.

4, Evidence on the Effects of the BOJ's Monetary Policy

There is already a significant amount of analysis on the effects of the BOJ's policy on asset prices and the economy during 1998-2006. The results of such works are not in complete agreement, but one of their main messages is that the commitment channel contained in the ZIRP, strategy (i), was effective. The commitments made by the BOJ had affected expected future short rates and, as a result, current medium- to long-term rates on government bonds. There is some evidence that liquidity expansion may have strengthened the commitment channel and/or affected stock prices. It may also have led to declines in risk premiums in the money market. Evidence is mixed on the effects of targeted asset purchases on asset prices, especially so, on the relationship between purchases of long-term government bonds and bond yields. There is evidence that other aspects of strategy (ii), the BOJ's attempts to contain risk premiums in the financial system, had some success, especially in terms of reducing risk premiums in the money market.

More specifically, both Okina & Shiratsuka (2004) and Oda & Ueda (2007) show that the BOJ's commitment to maintain a zero rate until deflation ended produced strong effects on expected future short rates, thus on current medium- to long-term interest rates; that is, strategy (i) was effective. Oda & Ueda (2007) also examine whether or not other aspects of the QEP, purchases of JGBs and/or expansion of the CAB target, had any effects on interest rates. They fail to find any significant effects of the BOJ's purchases of JGBs on either the expected future short rates or risk premiums.

In a separate work Bernanke, Reinhart and Sack (2004) carry out a macro finance analysis of the ZIRP and QEP and find that they had the effect of lowering a significant range of interest rates. They also carry out an event study of the effects of the BOJ policies and find statistically significant links between the BOJ's purchases of JGBs and JGB yields on the one hand, and between QEP and stock prices on the other.

The second finding of Bernanke, Reinhart and Sack (2004) seems to be an exception. In his survey of the BOJ's policies during this period Ugai (2007) concludes that the effects of strategy (i) were much greater than those of strategies (ii) and (iii).

Most of such analyses of strategy (ii), however, focused on the relationship between the BOJ's purchases of government bonds and interest rates and/or the economy. One exception is Baba et al (2005), which analyzed the effects of more credit easing aspect of strategy (ii). They look at the relationship between the BOJ's monetary policy and risk premiums banks pay in the money market. Specifically, they analyze movements over time of the dispersion of NCD (negotiable certificates of deposits) rates banks pay. As shown in Figure 1, the dispersion rose to very high levels during the period of a financial crisis in 1997-1998, declined sharply during the ZIRP period, rose

somewhat at the termination of the ZIRP, and declined again during the QE period to a level lower than that during the ZIRP period. They also show that the decline in the dispersion cannot be fully attributed to improvements of credit standings of Japanese banks after 1999. The paper also points out that risk premiums on CPs also declined during the QEP period, but by larger amounts for CPs eligible for the BOJ's repo operations. This finding is consistent with the existence of direct effects of targeted asset purchases on asset prices in the credit market.

In sum, there is evidence that strategy (i) and part of strategy (ii) had produced intended effects on asset prices. There is less evidence on the effectiveness of strategy (iii). There is even less evidence on the effects of any of these policy measures on output and prices of goods and services.

5, Non-traditional Policies adopted since 2007

A rough summary of non-traditional policies adopted by G7 central banks is provided in Table 3. As can be seen, strategy (ii) has been used by most central banks, while the other strategies have been only sparingly employed.

Strategy (i)

Very few central banks have used a strong explicit version of expectations management. One exception has been the Bank of Canada who issued a statement on April 21, 2009 that “*conditional on the outlook for inflation, the target overnight rate can be expected to remain at its current level until the end of the second quarter of 2010 in order to achieve the inflation target.*” The Fed has used a much weaker form of similar statement since December 16, 2008 when it said that “*the committee anticipates that weak economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time.*” In addition, Riksbank has published an expected path of the policy rate. None of these, however, are as explicit as the BOJ's commitment during 1999-2006 regarding the relationship between inflation and the durability of low interest rates.⁷

⁷ The measures adopted by the ECB and the BOJ, the fixed rate, full allotment of term funds seem to have had similar effects on money market term rates to those that arise when central banks use strategy (i) and promise to keep the policy rate at low levels for, say, three or twelve months. The two types of measures, however, are not equivalent. For example, under the current term fund supplying scheme, central banks can always terminate the program and raise policy rates, while under strategy (i) they will have to

Strategy (ii)

Strategy (ii) has been the major toolkit for many central banks during the current crisis. Many central banks have started or enlarged programs to purchase non-traditional assets. In the area of private credit, the BOJ, the BOE have bought commercial papers and corporate bonds; the ECB, covered bonds; the Fed, agency bonds and agency MBSs. The BOJ has also bought equities from banks and instituted a program to make subordinated loans to banks.

Most central banks have both lengthened the terms of and expanded the menu of eligible collateral for liquidity supplying operations. For example, the fixed rate full-allotment liquidity programs of the BOJ and the ECB have been offered at subsidized rates relative to the market and met with huge subscriptions. In addition, some have taken non-standard assets as collateral. For example, the Fed has lent against ABS under the TALF program and against CP and ABCP under AMLF, CPMF and MMIF programs. Many have also lent to non-standard entities. For example, the Fed has lent to nonbanks such as broker-dealers, money market mutual funds and investors in ABSs. Another significant move has been the supply of US dollars in non-US markets under the dollar SWAP program between the Fed and other central banks.

The characterization of all these moves as nontraditional may be problematic. Some may be more appropriately regarded as an expansion of usual liquidity provision.⁸ Also, the definition of nontraditional assets and/or entities differs from country to country. Thus, no attempt is made here to offer a rigorous definition/characterization of strategy (ii) or credit easing in the current episode.

One remaining issue regarding strategy (ii) is the characterization of purchases of government bonds. With the exception of the ECB, most major central banks have either started or expanded the program to purchase government bonds. The BOE has characterized it as an element of quantitative easing, i.e., strategy (iii). In contrast, the Fed stated in its 2009 March FOMC statement that “*to help improve conditions in private credit markets, the Committee decided to purchase up to \$300 billion of longer-term Treasury securities.*” Thus, government bond purchases are regarded as an

hold policy rates at low rates for the duration of the promise.

⁸ Bernanke (2009) and Madigan (2009) attempt to characterize some of these operations as an expansion of the traditional lender of last resort function of central banks. There are, however, differences between LLR and credit easing. Under LLR central banks are easing problems on the liability side of, while under many of the credit easing measures central banks are easing problems related to specific assets held by private banks

element of credit easing by the Fed. The BOJ considers the purchases as simply a means of liquidity provision at low frequency. It is probably difficult to justify government bond purchases as a central bank response to sharp declines in market liquidity.⁹ It seems fair to say that central banks have not found a uniform answer to the question of why they buy government bonds.

Strategy (iii)

During the current crisis no central banks have used a strong version of this strategy. One that comes close to is the BOE who has set an upper limit for its purchases of government bonds and stated that the bond purchases would have the effect of increasing the money supply, which in turn would stimulate the economy. The BOE has called this scheme quantitative easing. Even in this case, no policy target has been set for a measure of the quantity of money unlike the case of the BOJ during 2001-06.

On the other hand, most central banks have expanded their balance sheets and, as a result, excess reserves are well above zero, i.e., adopted weak forms of quantitative easing. Such an expansion of central bank balance sheets seems to have been a result of strategy (ii) rather than of an explicit attempt to employ strategy (iii). Use of targeted asset purchases, say, requires an injection of reserves to the system. In order to avoid an expansion of its balance sheet the central bank needs to drain the system of the same amount of reserves. It appears that many central banks have decided not to carry out such un-sterilization. Some seem to have thought that the existence of positive amounts of excess reserves would act as a liquidity buffer in the case of a worsening of counterparty risk perception; some others lacked the tool for mopping up the excess reserves promptly.

The meaning of the expansion of central bank balance sheet has become even more blurred due to the increased practice of paying interest on bank reserves. The FED and BOJ have recently started this practice as a means of maintaining the policy rate at positive levels when excess reserves are positive as a result of, say, credit easing policies as explained above. Payment of interest on excess reserves certainly lowers private banks' incentive to turn the reserves to other interest earning assets and thus undermines the stimulative power of "quantitative easing."¹⁰ It is, on the other hand, an

⁹ An exception is the market for Japan's inflation indexed bonds and variable rate bonds where concentration of bond holdings in the hands of a small number of investors has led to sharp declines in market liquidity. In fact, the BOJ decided in December 2008 to start buying these instruments.

¹⁰ Curdia and Woodford (2009) show that under certain assumptions it is optimal to

effective tool to raise market interest rates even in the presence of significant excess reserves, as we discuss below.

6, Discussion

Heavy Reliance on Strategy (ii) and the Unpopularity of Strategies (i) and (iii)

As pointed out above, most central banks have relied much on strategy (ii) since 2007. On the other hand, strategy (i) or (iii) has not been widely used. Of course, strategy (iii) has been employed in weak forms by most major central banks. As discussed above, however, this was mostly a result of strategy (ii) and the decision by central banks not to drain the financial system of excess reserves supplied. Very few central banks, with the exception of the BOE, have stated that the expansion of central bank balance sheets or some measure of the quantity of money by itself exert strong positive effects on the economy. It is also noteworthy that no central banks have gone to the extreme of lowering the policy rate to literally zero as did the BOJ in 1999-2006.

Such characteristics of the monetary policy measures adopted during the current episode seem to be the result of two factors: one, the major problem central banks faced was the financial crisis rather than serious deflation; and, the other, central banks seem to have learned about the pros and cons of non-traditional policies from the BOJ's experience.

As shown in Figure 3, the core CPI inflation rates in the U.S. and EU are surprisingly high despite the severity of the recession. As stated by Taylor (2009), inflation and output alone do not justify near zero levels of the policy rate. Thus, even the setting of the level of the policy rate, the conventional policy tool, has been significantly guided by financial system considerations. Needless to say, the heavy use of strategy (ii) related measures is explained by the severity of the financial crisis.

The unpopularity of strategy (i) or (iii) may have been partially a result of the BOJ experience during 1999-2006. As discussed in section 4, there is still not much evidence in favor of the effectiveness of strategy (iii). This may have affected the choice of strategy by other central banks.

Strategy (i) has been found to be effective. This strategy, however, has its own limitations. First, it requires forces other than monetary policy to lift the economy out of a liquidity trap. This is because the essence of the strategy is about affecting

satiating the system with excess reserves and paying an interest rate on reserves equal to the policy rate.

expectations of the level of the policy rate when a zero or very low rate is no longer necessary. Should the probability of the economy getting out of the liquidity trap is zero, this strategy is not going to work. This means that, depending on what will happen to exogenous shocks, or in other words, to the natural rate of interest, the economy under strategy (i) could be stuck at a zero interest rate for an embarrassingly long period of time. The BOJ essentially was unable to, except for a brief interruption in 2000-2001, exit from the ZIRP for more than 6 years.

The second serious problem with the expectations management approach is that it may not be time consistent. It is a promise of monetary expansion when the economy is out of the liquidity trap that generates easing effects. A central bank that finds that the economy is out of the trap, however, may not want to carry out the promised monetary expansion. In other words, a central bank that uses the approach needs to commit to a higher inflation target than usual, or accept the risk of inflation temporarily overshooting the target. In either case, the central bank has an incentive to renege on its promises. As M. King (2004) puts it, whether or not collective decision making today can bind that of future decision makers is a difficult question.

The above discussion suggests an alternative explanation for the unpopularity of strategy (i) in the current episode. Central banks currently may not want to raise their inflation targets or accept periods of higher inflation than target as would be the case if they were seriously following strategy (i). This inclination of central banks is somewhat understandable, but deprives them of an important policy tool at the ZLB.

Maintenance of policy rates at small positive levels

Another salient feature of monetary policy during the recent period has been the tendency to avoid lowering their policy rates completely to zero and instead to maintain them at small positive levels. Thus, the BOJ's policy rate is at 0.1%; it is zero to 0.25% in the U.S., etc. In contrast, during 1999-2006, the call market rate, usually the policy rate for the BOJ, recorded a minimum of 0.001%.

Many central banks have stated the reason for the maintenance of a small wedge between the policy rate and zero. The Fed stated that "*very low levels of federal funds rate also had potential costs in terms of the functioning of certain financial markets and some financial institutions.*"¹¹ Similarly, the BOE said "*the Committee remained concerned that a further reduction could have some adverse impacts on the economy, given its effects on the profits that banks and building societies were able to make*

¹¹ Minutes of the 2008 December FOMC meeting.

through the spread between deposit and lending rates. In addition, a sustained period of very low interest rates could impair the functioning of money markets, creating difficulties in the future, when interest rates needed to rise.”¹²

It seems unclear if such costs of zero rates in terms of the functioning of money markets are significant. In fact, Japanese financial markets did not seem to have experienced serious dislocations when the BOJ raised rates from zero for the first time in six years in 2006. Very likely, central banks have compared small costs of going to a zero rate with what appeared to be small benefits of doing so and decided not to do so. The view about the benefit of a zero rate must have been influenced by the BOJ’s experience.

Evidence on the effects of Strategy (ii)

There is some informal and formal evidence that strategy (ii) type measures, especially, credit easing measures adopted during 2007-2009 have exerted expected effects on asset prices. Dudley (2009a) summarizes the major part of the Fed’s experience by saying that purchases of MBS have been effective as can be seen from the sharp declines in MBS spreads. He also adds that the effects of the purchases of US Treasuries have been unclear. Dudley (2009b) discusses the effects of the TALF program. He considers that the program has been effective because (a) the issuance of consumer ABS has been gradually reviving in a way not wholly reliant on TALF financing and (b) the spreads on consumer ABS has been narrowing; for example, spreads on AAA rated credit card declined from a peak of 600, to 200 basis points as of early July 2009.

More formally, the BOJ (2009) presents an analysis of the BOJ’s credit easing measures on credit market issuance rates. Specifically, it estimates the effects on CP issuance rates of the BOJ’s measures to facilitate corporate financing. The measures consist of expanded CP repo operations, fixed rate full allotment three month fund supplying operation against corporate debt, outright purchases of CPs and corporate bonds, and an expansion in the range of corporate debt eligible as collateral.

The major part of the analysis is a regression of the spread between CP issuance rates and OIS rates on stock market volatility, the spread between TIBOR and OIS rates and the share of the outstanding amount of the BOJ’s operations to facilitate corporate financing in commercial papers outstanding. The result indicates that all three variables enter significantly. Thus, among other things more BOJ operations in this area lowered

¹² Minutes of the 2009 March MPC meeting.

the CP spread. Interestingly, the effects of the operations are larger for a-1 rated CPs than those rated a-1+, reflecting more stress in the market for a-1 than for a-1+ CPs. Also, it is found that the BOJ's operations had positive spillover effects into the market for CPs rated a-2 which were not subject to outright purchases by the BOJ.

Christensen, Lopez & Rudebusch (2009) estimate a six latent factor model of the treasury yields, corporate bond yields and Libor. By interpreting movements in what they call the Libor factor after late 2007 to be the effects of Fed's various liquidity facilities they show that the facilities have reduced Libor spreads significantly.

Such an analysis shows that some of the credit easing measures used by central banks since 2007 have had the intended effect of containing risk/liquidity premiums in stress ridden parts of the credit market.

In contrast, as stated by Dudley (2009a), the effects of government bond purchases on interest rates have been unclear. If anything, government bond yields have risen since the Fed and the BOE have started to purchase government bonds. Since at least part of the rise in yields is due to improved economic outlook, it is difficult to determine whether the central bank bond purchases have been the cause of the rise in interest rates. Theoretically, yields could move in either direction in response to central bank purchases of government bonds. There also is not clear evidence on the effects of the BOJ's purchases of government bonds on interest rates. More research seems necessary on this question.

More on the Comparison of the BOJ Experience during 1998-2006 and the Current Easing by Major Central Banks

So far, we have discussed monetary policy measures currently adopted in the light of the BOJ's experience during 1998-2006. More insight seems to be gained by studying the Japanese experience in earlier years. Figures 2 and 3 show three month interbank rates in real terms (for the U.S. and Japan) and core CPI inflation rates (for the U.S., EU and Japan), respectively.

Looking at Figure 2, we find that this measure of the real interest rate has not fluctuated much in Japan since 1995. There has been a small decline in nominal interest rates in response to monetary easing, which has been more than offset by a rise in the rate of deflation. In contrast, the real money market rate has fluctuated in a much more dynamic way in the U.S. During boom years it was around 3-4%, while in recessions it was driven down to negative territory as is the case in the period since early 2009. Such large swings in the real interest rate surely has been at the root of strong effectiveness of

the Fed's monetary policy, while the absence of corresponding large interest rate movements must have constrained Japanese monetary policy. Figure 3 indicates that such dynamism in the U.S. stems from relatively high rates of inflation in the U.S. as opposed to the stagnant behavior of inflation in Japan at around 0 to -1 % since the late 1990s. The higher average rate of inflation in the U.S. has meant a higher average level of the nominal interest rate and thus the absence of the constraint created by the ZLB until very recently.

Needless to say, nontraditional monetary policy measures have been attempts to get around this difficulty created by the ZLB. Despite the use of many bold measures by the BOJ, however, Japan's inflation has not exceeded 0% by a comfortable margin since the late 1990s. Japan's experience seems to suggest that once the economy hits the ZLB there is significant limitation to what monetary policy can do.

Challenges faced by U.S. and European central banks since 2007 seem close to those faced by the BOJ in the early 1990s. The collapse of asset price bubbles exerted strong negative effects on the financial system and the real economy in both periods. In response, the BOJ lowered rates aggressively between 1991 and 1995; thus, the real interest rate in Figure 2 declined by about 600 basis points. This is comparable to the size of rate cuts by the Fed during the current episode.

The Fed has acted, however, more promptly in its rate cut decision and also addressed financial system problems at a much earlier stage than did the Japanese authorities in the early 1990s. It was not until the mid 1990s that the BOJ and the Japanese government started to take serious measures against financial system problems. As we discussed, it was not until 1998 or later that the BOJ started to employ non-traditional monetary policy tools, that is, largely after the economy was in a liquidity trap. The Fed and other central banks started to use non-traditional measures before rates came close to the ZLB, although nominal rates are now around zero in many countries.

In a sense, however, this is not a fair comparison. The severity of the current financial crisis and recession is unprecedented in the post war period. This, of course, has been the major reason for the prompt action by the monetary and fiscal authorities. I may also point out that central bank policies in earlier periods may have been a major cause of the current crisis and they may have aggravated the crisis at initial stages.¹³

¹³ We also have to point out that a major cause of the crisis has been the easy monetary conditions that prevailed since the mid 1990s, especially since the early 2000s. There also seems to have been a short recognition lag on the part of the authorities in the summer and fall of 2007; that is, they failed to realize the nature of the problem promptly and, as a result, failed to provide large amounts of term funds at early stages

Central banks around the world also have been able to learn from the BOJ's experience.

It seems fair to say, however, that after the severity of the crisis went beyond a certain point, the U.S. and EU authorities responded promptly and, as a result, there is the hope that the world will avoid a Japan style prolonged period of stagnation. The seeming ineffectiveness of some of the non-traditional measures in the Japanese context during 1999-2006, as summarized in section 4, might mean that they came too late. The message then is that if the policy rate is zero and if the financial system is in serious trouble, limitations on a central bank's ability to stimulate the economy are huge.¹⁴ It also seems to imply that should inflation rates fall close to zero in the U.S. and EU despite bold attempts by monetary and fiscal authorities the economies will very likely be in for a prolonged period of stagnation.

of the crisis. This failure may have turned some of the liquidity problems into solvency issues

¹⁴ Curdia and Woodford (2009), however, argue that the ZLB does not pose a serious constraint on monetary policy because a version of price level targeting can be used to get around the difficulties generated by the ZLB.

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Table 1 Policy Options near the ZLB

Strategy i	managing expectations about future levels of the policy rate
intended effect	today's medium- and long-term rates will be affected
Strategy ii	targeted asset purchases (may include lending against non-traditional assets)
intended effect	changes in relative asset supplies will change asset prices liquidity premiums in dysfunctional markets will be reduced
Strategy iii	Quantitative Easing (expansion of central bank B/S to generate excess reserves)
intended effect	investors may rebalance portfolios / inflation expectations may rise

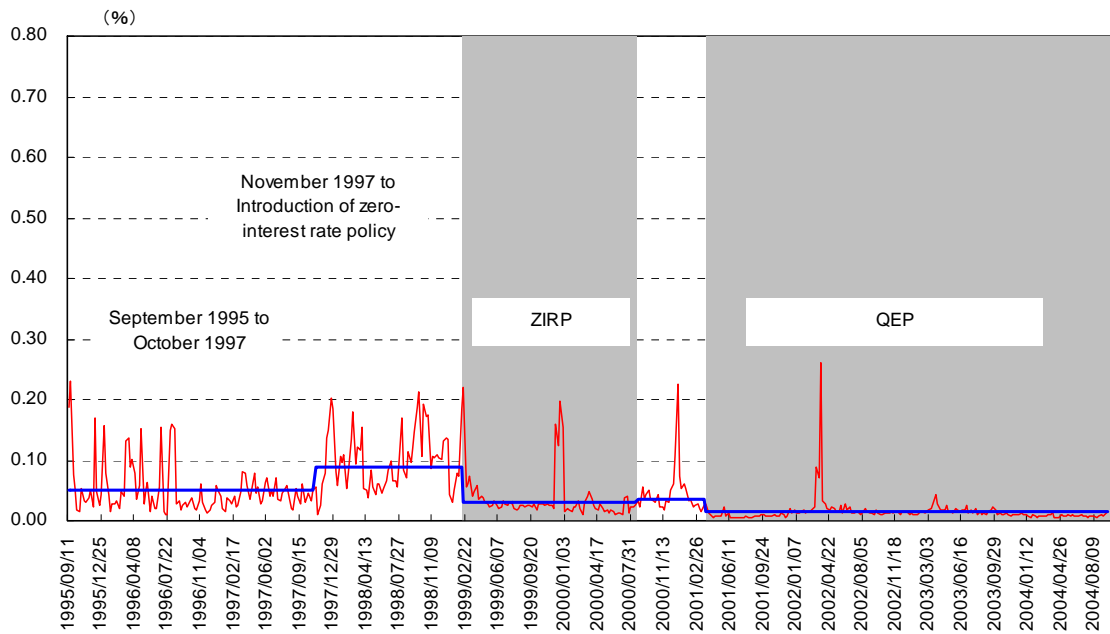
Table 2 The BOJ's Non-traditional Operations during 1999-2006

Strategy i	zero rate until deflationary concerns are dispelled (April 1999-August 2000) zero rate until CPI inflation becomes stably above zero (March 2001-March 2006)
Strategy ii	CP repo unusually long-dated fund supplying operations purchases of equities from banks purchases of ABCP/ABS
Strategy iii	Quantitative Easing (target on the banks' current account balances at the BOJ)

Table 3 Examples of Non-traditional Policies during 2007-2009

Strategy i	Bank of Canada: The O/N rate can be expected to remain at current level until 2010QII (Aprril 2009) FRB: the committee anticipates economic conditions are likely to warrant low levels of FFR.
Strategy ii	purchases of corporate bonds (BOJ, BOE), CPs & equities (BOJ), covered bonds (ECB), Agency bonds, Agency MBS (FRB) lending against securitized assets (FRB) fixed rate full allotment liquidity provision at below market rates (BOJ, ECB) US dollar repo (major central banks)
Strategy iii	BOE's Asset Purchase Facility

Figure 1, Dispersion of Newly Issued NCD Rates (Less than 30 Days)



adopted from Baba et al (2007)

Figure 2 Interbank Rates in Real Terms

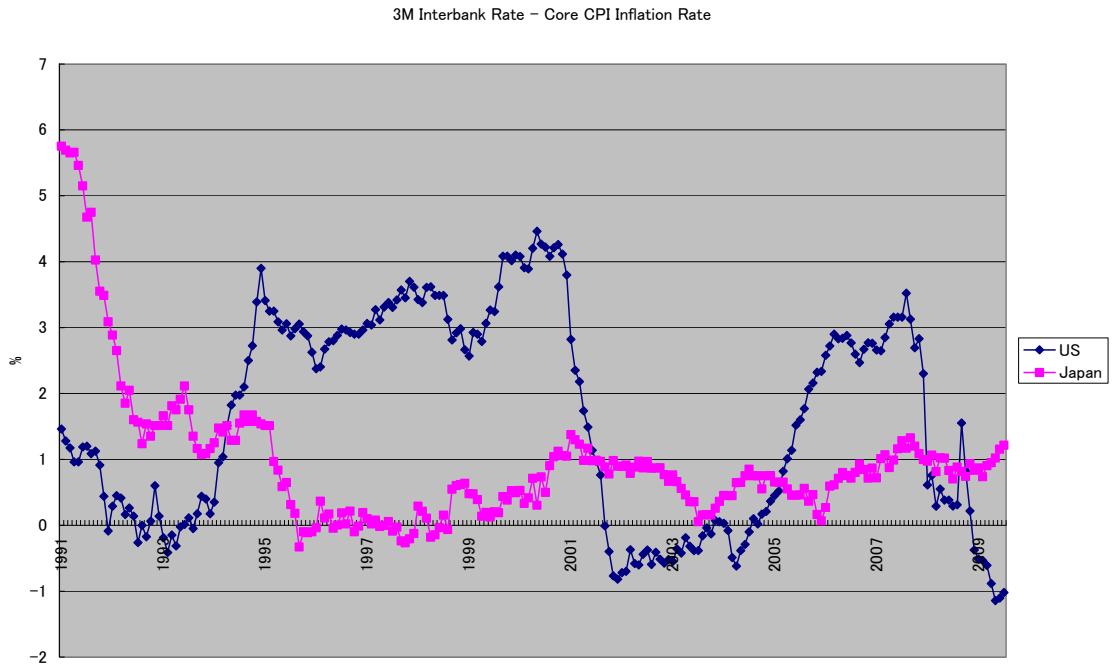


Figure 3, Core CPI Inflation Rates in US, EU and Japan

