

The Role and Effectiveness of Unconventional Monetary Policy*

Peter J. Morgan**

This paper reviews the effectiveness of unconventional monetary policies and their relevance for emerging markets. Such policies may be useful either when interbank rates fall to zero, or when a credit crunch or rise in risk premium impairs the normal transmission mechanism of monetary policy. Unconventional monetary policy measures encompass three broad categories: (i) commitment effect, i.e., verbal commitments to maintain very low interest rates for a certain period, either conditionally or unconditionally; (ii) quantitative easing, i.e., targeting the level of current account balances of the central bank; and (iii) qualitative or credit easing, which involves purchases of targeted assets to lower rates and/or increase liquidity in the target market. It also examines issues related to the exit strategy from unconventional policy, and assesses the applicability of unconventional policies for Asian economies other than Japan.

Most studies of the commitment effect (or duration effect) suggest that statements by a central bank regarding the duration of a policy of very low or zero interest rates also affect market expectations of interest rates, but the impact is mainly limited to shorter-term rates. The literature on the effects of quantitative easing monetary policy is less conclusive, especially when one accounts for other announcements by the central bank. Regarding qualitative easing (credit easing) policy, the effect of expanding outright purchases of government bonds on bond yields looks limited. However, other kinds of asset purchase interventions do seem to have been more successful in relieving market stresses.

For Asian countries aside from Japan, unconventional policies look most attractive as a way to relieve funding blockages in specific

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** Senior Consultant for Research, Asian Development Bank Institute.

markets rather than to stimulate overall growth. Only India; Republic of Korea; Singapore; and Taipei, China adopted unconventional measures, and those of the middle two were chiefly related to their use of the Fed's swap line for United States dollars to ease dollar shortages in the region. However, if growth of United States consumption slows structurally, this may force Asian economies to rely more on unconventional monetary policy measures during future downturns.

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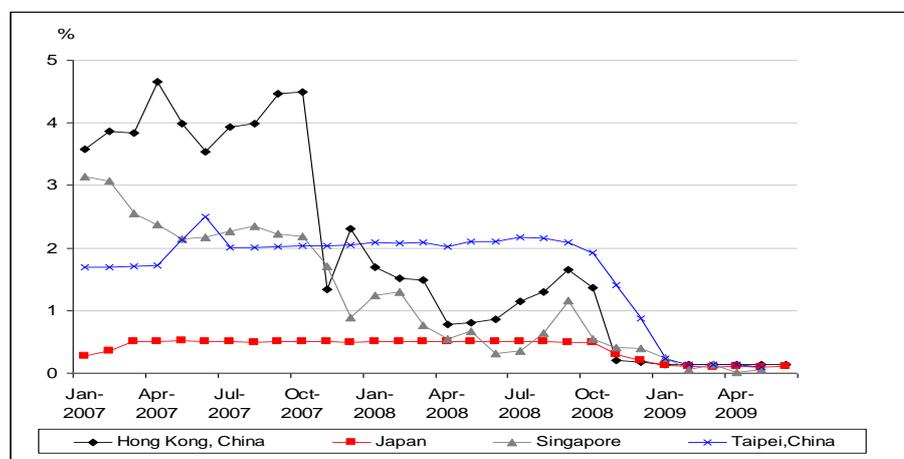
Keywords: monetary policy, unconventional monetary policy, interest rates, money markets, bond markets

1. INTRODUCTION

The current global financial and economic crisis is perhaps unique in the number of countries that have seen short-term interest rates fall to nearly zero. Countries with policy rate targets of 0.5% or less include United States, Japan, United Kingdom, and Canada. Although Japan is the only Asian country with official rates this low, short-term money market rates have sunk to nearly zero in a number of economies, including Hong Kong, China; Japan; Singapore; and Taipei, China (see figure 1). Because conventional monetary policy operates mainly by setting interest rate levels, this means that the limits of conventional policy have already been reached in these economies, and that any further monetary stimulus must be obtained from “unconventional” means.

The current crisis has also been characterized by a breakdown in the normal transmission mechanism of monetary policy. Reflecting a sharp increase in perceived risk of insolvency of financial institutions and other firms, spreads widened sharply in a number of markets, including those for interbank deposits, commercial paper, corporate bonds, and government bonds in emerging economies. Some markets stopped functioning altogether, especially those related to asset-backed securities. As a result, a reduction of

Figure 1 Asian Economies with Overnight Interbank Rates Near Zero (Monthly Average)



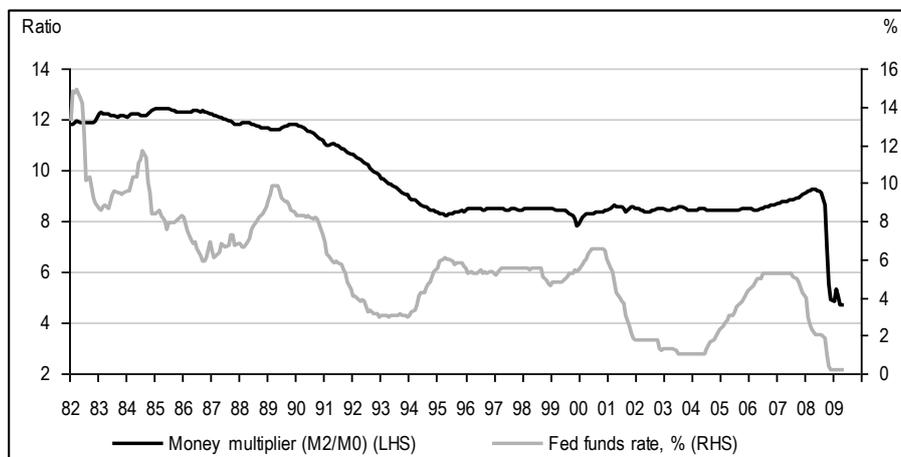
Source: CEIC Data Co. Ltd. database.

policy rates often failed to be reflected in a commensurate decline in market rates, while, in some cases, a credit crunch developed where credit was not forthcoming at all. This situation can occur even when short-term rates are above zero, but still calls for unconventional policy responses.

Section 2 of this paper reviews the range of “unconventional” monetary policy tools available to central bankers and summarizes their theoretical strengths and weaknesses. Section 3 reviews available empirical studies of their effectiveness and other recent evidence. Section 4 reviews issues related to exit strategies and other risks. Section 5 assesses the applicability of unconventional monetary policy measures to the current situation of Asian economies and other emerging markets.

2. UNCONVENTIONAL POLICY TOOLS

Once regarded as an historical relic of the Great Depression, the significance of the zero lower bound (ZLB) on interest rates as a constraint

Figure 2 US Money Multiplier has Broken Down

Note: LHS=left-hand side, M0=monetary base, M2=broad money, RHS=right-hand side.
 Sources: CEIC Data Co. Ltd. database, Asian Development Bank Institute estimates.

on the effectiveness of monetary policy has received much attention as a result of Japan's experience with deflation between 1999 and 2006 and concerns about the risk of deflation in the United States (US) following the collapse of the information technology bubble in 2000. Ironically, the seeds of the current recession in the US could partly be traced to the concerns of the US Federal Reserve about avoiding deflation in the early part of this decade, which led it to adopt an overly easy monetary stance. Although this bias toward easing was aimed at stabilizing the consumer price index (CPI), it ended up destabilizing housing and other asset prices, which contributed to the development of the housing bubble there. Now the US and much of Western Europe have fallen into liquidity traps as well. This can be seen most obviously by the breakdown of the traditional relationship between the monetary base (M0) and broad money (M2) (see figure 2). In other words, the money multiplier has broken down.

Much of the current literature on unconventional monetary policy can be traced back to Krugman, Dominquez, and Rogoff (1998), which focused on the problem that deflation prevents the real interest rate from falling enough to achieve full employment. Krugman and others argued that, in principle,

the central bank must offset this by trying to raise the market's expectations about future inflation in order to bring down the real interest rate sufficiently to stimulate aggregate demand.

Bernanke and Reinhart (2004) divided unconventional monetary policy tools into three main categories:

- (i) providing assurance to investors that short rates will be kept lower in the future than they currently expect (“commitment effect”);
- (ii) increasing the size of the central bank's balance sheet beyond the level needed to set the short-term policy rate at zero (“quantitative easing”); and
- (iii) changing the relative supplies of securities in the marketplace by altering the composition of the central bank's balance sheet (“qualitative easing” or “credit easing”).

The central bank has another powerful option, namely, buying foreign currency assets in order to depress the value of the country's foreign exchange rate and thereby stimulate export demand. This effect was analyzed by Svensson (2001), among others, and could be particularly powerful for a small open economy. However, the stigma associated with adopting “beggar-thy-neighbor” policies appears to have effectively discouraged central banks from adopting such policies during economic downturns. There are plenty of recent examples of central banks intervening to maintain a stable exchange rate or to slow currency appreciation during an expansion phase, but no obvious examples of intervention to engineer currency depreciation as a macroeconomic stabilization tool during an economic downturn. In the remainder of this section, I examine the three categories of unconventional measures described above.

Commitment Effect: A large literature has developed around the first category, which generally is referred to as the “commitment” or “policy duration” effect. The basic idea is simple — even though the central bank

may set the very short-term rate, normally the overnight interbank rate, at zero, the market still has considerable uncertainty about the future development of monetary policy. This is reflected in the yield curve, since longer-term rates essentially reflect the market's expected future path of short-term rates plus a risk premium. Therefore, if the central bank can persuade the market that it will keep the policy rate lower than the market would expect otherwise, this should cause longer-term rates to fall, thereby stimulating the economy. This type of policy has been analyzed theoretically by a number of authors, including Svensson (2001) and Eggertsson and Woodford (2003).

Typically, the central bank commits to maintain its policy interest rate at zero for a certain period. This commitment could be conditional or unconditional, but normally is conditional because a central bank cannot reasonably be expected to ignore future developments. In particular, it would be normal for the central bank to start raising interest rates once the economy has recovered and inflation has begun to pick up, so the central bank might commit to keep rates at zero until these conditions were achieved. The first instance of such a commitment in recent times was the declaration by the Bank of Japan (BoJ) in April 1999 that it would maintain its zero-interest-rate policy until "deflationary concerns were dispelled" (Okina and Shiratsuka, 2004, pp. 75-76). In May 2001, the Bank of Japan took a more refined approach by promising that it would keep its policy rate at zero until consumer price inflation "stably" registered zero percent or positive year-on-year growth (Bank of Japan, 2001). It further clarified its definition of what the end of deflation meant in October 2003 (Bank of Japan, 2003). In the US, the August 2003 statement of the Federal Open Market Committee that "policy accommodation can be maintained for a considerable period" is another example of a commitment by policymakers (US Federal Reserve Board, 2003). Indeed, the Fed is now using similar language, as its policy statement in December 2008 noted that "economic conditions are likely to warrant exceptionally low levels of the federal funds rate for an extended period" (US Federal Reserve Board, 2008).

Many, including Reifschneider and Williams (2000), have proposed that the commitment to keep rates at zero should be maintained well beyond the time when inflation turns positive. This would effectively lower the market's expectation of real interest rates, thereby imparting a greater stimulus to the economy and minimizing the losses of output resulting from the economy being stuck at the zero bound during periods of inflation. Many variations of "backward-looking" policy rules for the inflation target, price-level target, or modified Taylor Rules have been proposed to minimize output losses. They generally have the feature that, the greater the cumulative loss in output due to deflation, the more the policy target must adjust, in terms of higher target inflation rate or price level, in order to compensate for this. However, there are no recent examples of central banks implementing such rules, so they will not be examined in this study.

Quantitative Easing: Another form of easing is to expand the size of the central bank's balance sheet by increasing the size of reserve deposits — current account balances (CABs) — beyond the level that is required to bring the overnight funds rate to zero (The monetary base consists of both cash in circulation and reserve deposits, but the central bank can only directly affect the level of reserve deposits.). This is referred to as "quantitative easing" (QE) and, according to Bernanke and Reinhart's typology, focuses on the liabilities side of the central bank's balance sheet. Possible channels of impact of such a policy include (i) the portfolio balance effect, i.e., if money is an imperfect substitute for other financial assets, the rise in money holdings leads investors to shift toward other assets, thereby raising their value and stimulating final demand; (ii) providing a clearer signal of the central bank's commitment to keep the policy rate low; and (iii) a permanent increase in the money supply could reduce the expected value of government debt servicing costs, thereby reducing the expected value of future tax payments. The first effect was investigated by Goodfriend (2000) in detail. The third effect was investigated by scholars including Auerbach and Obstfeld (2005).

The magnitude of the portfolio balance effect can be influenced significantly by the interest rate that the central bank pays to banks on their reserve deposits at the central bank. If the central bank pays a positive interest rate on reserve deposits, this will discourage banks from shifting out of excess reserves into other assets such as loans. Paying interest on reserve deposits is very close to sales of bills by the central bank as a funds-absorbing operation to tighten money market conditions. On the other hand, if the central bank pays a zero or even a negative interest rate, this would encourage re-intermediation. Goodfriend (2000) analyzed how the central bank could push nominal interest rates below zero throughout the economy by paying negative interest rates on reserve deposits. On 1 July 2009, the Swedish Riksbank actually cut the interest rate it pays on reserve deposits to minus 0.25%, the only recent instance of a central bank doing so. US Federal Reserve Chairman Ben S. Bernanke observed that recent US legislation to allow the Fed to pay interest on reserve deposits gives the Fed greater flexibility to reduce its balance sheet when it needs to implement its “exit strategy” for tightening monetary policy (Bernanke, 2009b). The last point is discussed further below.

The main theoretical objection to quantitative easing is that, at zero interest rates, money and short-term paper are perfect substitutes, so changes in the level of current account balances simply represents shifts in holdings of assets that are essentially the same, and hence should have no real economic impact. However, there is some evidence in favor of the portfolio balance effect, which is discussed below.

The main example of quantitative easing was its implementation by the Bank of Japan in April 2001, when it shifted its policy target from the overnight call rate to the level of CABs. This policy was maintained until March 2006. Most recently, the Bank of England adopted quantitative easing on 5 March 2009, although the bank rate is still positive.

One drawback of quantitative easing and, indeed, of the zero-interest-rate policy (ZIRP) is the distortion of the functioning of the money market due to the very low level of interest rates resulting from the fact that money market

brokers cannot cover their costs. Indeed, balances in Japan's call market dropped dramatically by almost half during the operation of the QE policy, while balances in the Euroyen market fell almost 90%. As a result, during the current global financial crisis, the BoJ has kept the overnight call rate at 0.1%, just high enough to cover the costs of the money market brokers. Other central banks have tended to keep the policy rate sufficiently above zero to preserve the functioning of money markets as well.

Qualitative Easing: The third set of policies is aimed at varying the mix of assets held by the central bank, and is referred to as “qualitative easing” or “credit easing”. The basic idea is that operations to change the shares of various kinds of assets held by the private sector will lead to changes in their relative prices, and thereby have implications for real economic activity. For example, if the central bank increases its outright (permanent) purchases of long-term government bonds, this could be expected to reduce long-term bond yields and stimulate the economy. Qualitative easing also includes direct lending to market participants in cases where the normal transmission mechanism breaks down. In this case, policies are focused on reducing credit market spreads and improving the functioning of private credit markets more generally. Like quantitative easing, qualitative easing generally involves an increase in the size of the central bank's balance sheet, but the focus is on the mix of assets, not the level of bank reserves (liabilities). This is particularly relevant during the current global financial crisis, where credit spreads have been much wider and credit markets more dysfunctional in the US and other countries than was the case in Japan during Japan's experiment with quantitative easing.

In a recent speech (Bernanke, 2009a), US Federal Reserve Chairman Bernanke distinguished between three kinds of qualitative easing activity:

- (i) the central bank's traditional role of provision of short-term liquidity to sound financial institutions, i.e., “lender of last resort” activity;
- (ii) provision of liquidity directly to borrowers and investors in key credit

- markets; and
- (iii) purchase of longer-term securities for the Fed's portfolio.

All of these measures could be seen as responses to malfunctioning of credit markets due to severe market concerns about capital adequacy and bankruptcy risk.

The first category starts with traditional borrowing at the discount window, which is not "unconventional," although it has long played a secondary role to open-market operations. The most straightforward kinds of easing involve relaxing the criteria for the kinds of borrowers or types of collateral that qualify for open-market operations, or extending the period of such operations. Financial market stresses led to the creation of a number of new programs in this category. In the US, this includes a number of new credit facilities for auctioning credit that were responses to stresses in the interbank funding market: the Term Auction Facility (TAF); Term Securities Lending Facility (TSLF); Primary Dealer Credit Facility (PDCF); and bilateral currency swap agreements with 14 foreign central banks, including the Bank of England, the European Central Bank, the Bank of Japan, the Bank of Korea, Monetary Authority of Singapore, and the Swiss National Bank (see Appendix A1 for a brief description of some of these programs and Appendix A2 for a chronology of announcements by the Fed and other central banks). The TAF was aimed at solving the stigma problem related to banks borrowing from the Fed, while the TSLF and PDCF provided comparable facilities for primary dealers. The swap agreements were aimed at easing shortages of US dollars in overseas markets. These loans are viewed as having very low risk, since they generally are over-collateralized and with recourse. Also, the foreign exchange swap agreements are made with other central banks, where there is a high degree of mutual trust.

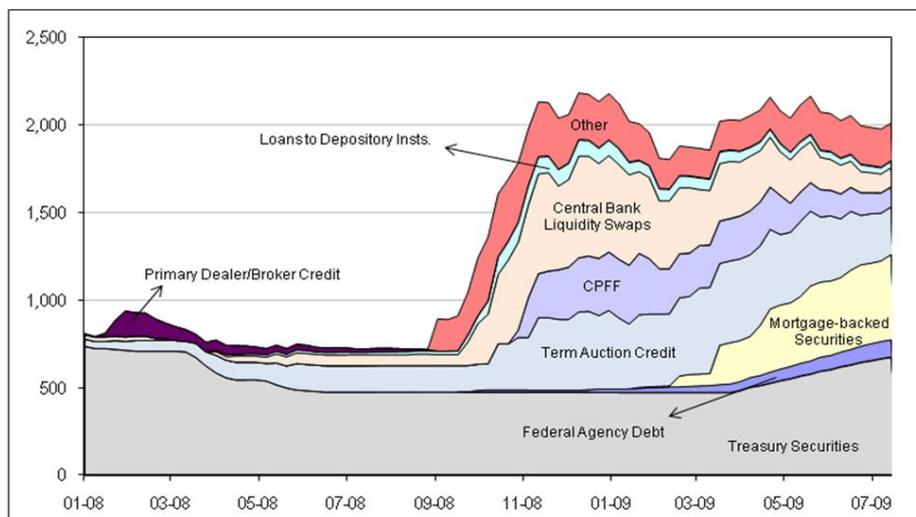
The second category of policies was aimed at other markets besides the interbank market, including the commercial paper market, the asset-backed securities market, and money market funds, which also showed increased signs of stress. In the US, these new programs included Asset-Backed

Commercial Paper Money Market Fund Liquidity Facility (AMLF); Commercial Paper Funding Facility (CPFF); Money Market Investor Funding Facility (MMIFF); and Term Asset-Backed Securities Loan Facility (TALF). The measures for asset-backed securities were aimed at AAA-rated securities collateralized by student loans, auto loans, credit card loans, and loans guaranteed by the Small Business Administration (jointly with the US Treasury to cover risk). Again, credit risk is seen as very low in both programs. In particular, the TALF program requires that loans be over-collateralized and is further protected by capital provided by the Treasury.

Under the third category, the Federal Reserve announced on 18 March 2009 that it will purchase cumulative amounts of up to US\$1.25 trillion of agency mortgage-backed securities and up to US\$200 billion of agency debt by the end of the year, and up to US\$300 billion of longer-term Treasury securities over the following six months (US Federal Reserve Board, 2009). The principal goal of these programs is to lower the cost and improve the availability of credit for households and businesses. On 19 January 2009, the United Kingdom (UK) Treasury specified the following types of sterling-denominated assets as eligible for purchase under the Bank of England's Asset Purchase Facility: commercial paper, corporate bonds, bonds issued under the UK's credit guarantee scheme, syndicated loans, and asset-backed securities "created in viable securitization structures" (Her Majesty's Treasury, 2009).

Figure 3 shows the trend of these different kinds of assets in the Fed's balance sheet. There has been a clear shift toward the third category since the Fed's statement on 18 March 2009, as the share of outright purchases in total assets has risen from 37% to 57% as of 10 June. Notably, the overall level of Fed assets has been relatively constant, as the rise in long-term holdings has been offset by substantial declines in short-term liquidity-related assets such as central bank liquidity swaps and the CPFF as funding pressures have eased in these segments. These trends suggest that the Fed already has its exit strategy well in mind, as will be discussed below.

During the period of the QE policy, the Bank of Japan progressively increased

Figure 3 Composition of Assets Held by US Federal Reserve (US\$ Billion)

Note: CPFF=Commercial Paper Funding Facility.

Source: Federal Reserve Bank of St. Louis FRED® economic database <http://research.stlouisfed.org/fred2/categories/32215> (accessed 20 July 2009).

the level of outright Japanese government bond (JGB) purchases from ¥400 billion per month to ¥600 billion on 14 August 2001; to ¥800 billion on 19 December 2001; to ¥1,000 billion on 28 February 2002; and finally to ¥1,200 billion on 30 October 2002. This level was maintained until 19 December 2008, when the Bank of Japan announced that the amount of outright purchases of JGBs would be increased to ¥1.4 trillion yen, and then finally to ¥1.8 trillion yen on 18 March 2009. It also expanded the range of JGBs accepted in outright purchases (30-year bonds, floating-rate bonds, and inflation-indexed bonds were added to the list of eligible JGBs). In addition, in order to prevent the remaining maturities of JGBs purchased from becoming too short or too long, it introduced a scheme to purchase JGBs from specific maturity segments (maturity segments are defined as 1 year or less, more than 1 year through 10 years, and more than 10 years). The BoJ also announced on 19 February 2009 that it would commence outright purchases of corporate bonds.

Table 1 shows a comprehensive list of qualitative easing measures adopted

Table 1 Qualitative Easing Measures Introduced So Far

Objective	Measures Adopted	Fed	ECB	BoE	BoJ	BoC	RBA	SNB
(i) Influence wholesale interbank market conditions	Modification of discount window facility	X		X				
	Exceptional long-term operations	X	X	X	X	X	X	X
	Broadening of eligible collateral	X	X	X	X	X	X	X
	Broadening of counterparties	X		X	X	X	X	
	Inter-central bank FX swap lines	X	X	X	X	X	X	X
	Introducing or easing conditions for securities lending	X		X	X	X		
(ii) Influence credit markets	CP funding/purchase/collateral eligibility	X		X	X	X	X	
	ABS funding/purchase/collateral eligibility	X	X	X			X	
	Corporate bond funding/purchase/collateral eligibility			X	X	X		X
(iii) Influence broader financial conditions	Outright purchase of public sector securities	X		X	X			
	Outright purchase of other non-public sector securities				X			X

Note: ABS=Asset-Backed Securities, BoC=Bank of Canada, BoE=Bank of England, BoJ=Bank of Japan, CP=commercial paper, ECB=European Central Bank, FX=foreign exchange, RBA=Reserve Bank of Australia, SNB=Swiss National Bank.

Source: Adapted from Bank for International Settlements (2009).

by various central banks during the current crisis. The breakdown follows that of Bernanke (2009a) mentioned earlier. Measures aimed at easing conditions in interbank markets were more numerous than those aimed at influencing credit markets, while those aimed at influencing broader financial conditions were rarest. This presumably reflects the relative unconventionality of the three stages, as central banks, being conservative,

tended to favor modest steps in the direction of unconventionality. All banks conducted exceptional long-term operations, broadened eligible collateral, and participated in foreign exchange (FX) swap lines with the Fed. For example, on 2 December 2008, the Bank of Japan announced that it would ease the criterion on credit ratings from “A-rated or higher” to “BBB-rated or higher”. Also, the Bank of Japan introduced, as a measure to enhance flexibility in funds-supplying operations collateralized by corporate debt, a new operation that provides funds over the fiscal year-end at an interest rate equivalent to the target for the uncollateralized overnight call rate. It also included the Development Bank of Japan Inc. as a counterparty in operations such as commercial paper (CP) repo operations. On 22 January 2009, it announced acceptance of debt instruments issued by real estate investment corporations as eligible collateral as well. On 19 February, government-guaranteed dematerialized commercial paper was included in eligible collateral, and the range of Japanese government securities offered in the security lending facility was broadened. On 7 April 2009, it also accepted loans on deeds to municipal governments as eligible collateral.

Regarding steps to influence credit market conditions, the most commonly taken steps were aimed at CP funding, followed by asset-backed securities and corporate bonds. Only the Bank of Japan and the Swiss National Bank purchased other non-public-sector securities such as equities. Among steps to influence broader market conditions, outright purchases of public sector securities were more common than those of private sector securities, but only three central banks did even this.

3. EVIDENCE OF EFFECTIVENESS OF UNCONVENTIONAL POLICIES

Although the theoretical literature on unconventional monetary policy has blossomed extensively over the past 20 years, empirical analysis of the impacts has been much more limited. This is not surprising, given that until

recently, only Japan in the period of 1999-2006 provided data on the experience of monetary policy at zero interest rates, at least since the Great Depression, and on quantitative easing between 2001 and 2006. Some analyses of the US experience with zero interest rates and unconventional policy are just beginning to emerge, e.g., McAndrews (2009). Unfortunately, this means that the bulk of the “empirical” analysis of unconventional monetary policies has been conducted with various kinds of macroeconomic models such as vector auto-regression (VAR) models. This raises questions about the validity of the results, as they depend critically on the extent to which the models capture the underlying behavior of the economy. Given the complexity and nonlinearity of the economy, one has to approach the results of this literature with a good deal of skepticism. This section reviews the evidence for the effectiveness of different kinds of unconventional monetary policies.

Analyses of unconventional monetary policy impacts face a number of other methodological problems. A number of different policies may be adopted at the same time, which makes it difficult to tease out their separate effects. Second, one has to identify the “counterfactual,” i.e., what would have happened in the absence of such policy steps? Third, it is necessary to identify the extent to which a specific announcement was a surprise to the market. Fourth, spillover effects may be important, i.e., market conditions in one country may be influenced by easing measures in another country.

Commitment Effect: There is a lot of evidence that announcements by central banks do affect market expectations about future policy, which should not be surprising, since market participants regard the direction of monetary policy to be an important influence on the path of interest rates and markets. Table 2 shows the results of a number of empirical studies of this effect. Most studies focused on the impact on the yield curve, which is the first and most obvious link in the transmission mechanism. Others looked at the impacts on credit spreads (which may be more relevant for the current crisis), real output, and inflation.

Table 2 Effectiveness of “Commitment Effect”: Empirical Studies

	Methodology	Country	Yield Curve	Credit Spreads	Output	Inflation
Baba <i>et al.</i> (2005b)	Macro finance model with use of augmented Taylor rule	Japan	Yes			
Baba <i>et al.</i> (2005a)	Time series / cross-sectional regression	Japan	Yes	Yes		
Bernanke, Reinhart, and Sack (2004)	Event study and macro/finance model with econometric model of yield curve	Japan, US	No: Yes			
Braun and Waki (2006)	Macro model with Taylor Rule	Japan			Yes	Yes
Fujiki, Okina, and Shiratsuka (2001)	Casual observation	Japan	Yes			
Fujiki and Shiratsuka (2002)	Econometric model of implied forward rates	Japan	Yes	Yes	Yes	Yes
Fujiwara <i>et al.</i> (2005)	Macro model with Taylor Rule	Japan	Yes	Yes	Yes	Yes
Kuttner and Posen (2001)	Casual observation	Japan	No			
Oda and Ueda (2007)	Macro/finance model with econometric model of yield curve	Japan	Yes			
Okina and Shiratsuka (2004)	Instantaneous forward rate (IFR) econometric yield curve model	Japan	Yes			
Reifschneider and Williams (2000)	Macro model with Taylor Rule	US			Yes	

Note: US=United States.

Source: Author's compilation.

Early studies such as Fujiki, Okina, and Shiratsuka (2001) and Kuttner and Posen (2001) relied on casual inspection and came up with opposite conclusions regarding impacts on the yield curve in Japan. Later studies

adopted more formal approaches. Japanese authors all found significant impacts of the commitment effect on the yield curve using a variety of methodologies, including time series/cross-section modeling of the yield curve and combinations of macro models with either a Taylor Rule decision function for monetary policy or an econometric model of the yield curve. Perhaps the most thorough of these are Okina and Shiratsuka (2004) and Baba *et al.* (2005b). However, Bernanke, Reinhart, and Sack (2004) argued that some of these studies did not adequately control for how rates would have moved in the absence of the policies adopted. Using an “event study” and “macro/finance” model approach, they analyzed the effects of Fed and BoJ statements on expected short-term interest rates, decomposing the impact into very short-term, 1-year forward, and 5-years forward. They found that, in the case of Japan during the period of the ZIRP, effects were statistically significant, but of a much smaller magnitude than in the case of the US — only about one-third as large. Also, they tended to be concentrated at the shorter end of the yield curve — the impact on the long end of the curve was relatively modest. Notably, they found no impact of BoJ statements on year-ahead expectations of short-term interest rates, a significant difference from the results for US Federal Reserve statements. This suggests that the BoJ statements themselves may not have been framed carefully enough to have maximum impact on market expectations.

Oda and Ueda (2007) used a similar approach and found evidence that the commitment effect did tend to lower interest rates. However, the effect was most pronounced for rates of three years or less, and was much more pronounced after the economic recovery began. This suggests that the commitment effect is least effective when it is most needed, i.e., when the economy is still in recession.

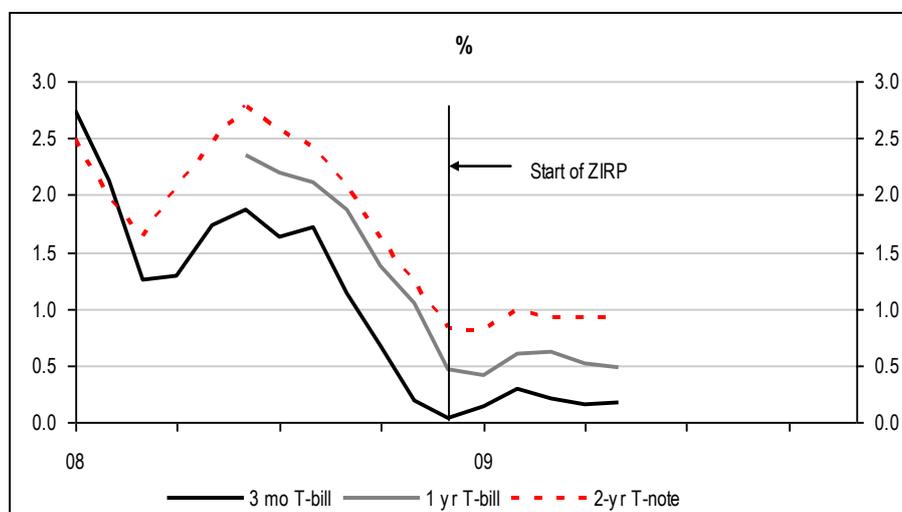
Fujiki and Shiratsuka (2002), Fujiwara *et al.* (2005), and Baba *et al.* (2005a) all found significant effects of the commitment effect in bringing down credit spreads as well. For example, Baba *et al.* (2005a) found that the switch to the ZIRP and then the adoption of definitions of ending deflation were correlated with a reduction in bank credit spreads.

Reifschneider and Williams (2000), using a macro model with a modified Taylor Rule that took into account past deviations in output resulting from the zero bound, found that the commitment effect had a significant impact on output and inflation in the US. Fujiki and Shiratsuka (2002), Fujiwara *et al.* (2005), and Braun and Waki (2006) all found positive impacts on output and inflation in Japan using a similar approach. However, these results have to be treated with skepticism, since, as mentioned above, they depend on the accuracy of the macro models used, which, in most cases, are highly simplified. Therefore, the overall conclusion appears to be that commitment effects do stabilize market expectations about the path of short-term interest rates and thereby tend to lower long-term rates. However, at least in the case of Japan, these effects were not large enough to affect expectations about the real economy and inflation sufficiently to produce effects on those variables.

The Fed reintroduced its commitment effect language in its statement on 16 December 2008 when it cut the target range for the Fed funds rate to 0-0.25%, noting that "... the Committee anticipates that weak economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time" (US Federal Reserve Board, 2008). Figure 4 shows that longer-term and short-term interest rates all fell sharply in December 2008. In particular, the one-year T-bill rate fell more than the three-month T-bill rate, and also considerably more than the two-year T-note rate. This suggests that the market expected that rates would stay "very low" for up to one year, pointing to a significant commitment effect. Of course, it may simply have reflected the market's worsening assessment of the economic situation, but the differential performance between the one-year note and the two-year note is suggestive. Interestingly, no other central bank has adopted a formal commitment regarding its policy during the current global downturn.

Quantitative Easing: The findings of the literature about the impacts of quantitative easing on interest rates and economic activity are generally positive, but more tentative than in the case of the commitment effect. The results of some major studies are summarized in table 3.

Figure 4 US Short-Term Government Bond Yields and Zero-Interest-Rate Policy



Note: ZIRP=zero-interest-rate policy.

Source: CEIC Data Co. Ltd. database.

Regarding the yield curve, Baba *et al.* (2005b) found that the level of CABs was significant in explaining the “expectations theory” component of interest rates, i.e., the market’s expectations of future short-term interest rates, but not the risk premium. They suggested that the level of CABs could have functioned as a signaling mechanism to strengthen the commitment effect. However, they cautioned that this correlation could be spurious, and that statements by the BoJ Governor made at the same time as the CAB level announcements could have been the main factor instead. On the whole, they concluded that the BoJ’s monetary policy worked mainly through the commitment channel in the period 1999-2004. Bernanke, Reinhart, and Sack (2004) found evidence suggesting that Japanese bond yields were lower than otherwise would have been expected, but their model did not differentiate between the impacts of the commitment effect and the CAB level. Interestingly, Okina and Shiratsuka (2004, p. 94) concluded that the instantaneous forward rate curve “... was hardly influenced by the increase

Table 3 Effectiveness of “Quantitative Easing”: Empirical Studies

	Methodology	Country	Yield Curve	Credit Spreads	Output	Price	Broad Money	Currency
Baba <i>et al.</i> (2005b)	Macro finance model with the use of augmented Taylor rule as monetary policy	Japan	Yes					
Baba <i>et al.</i> (2005a)	Regression of credit spreads on ratings and time period	Japan		Yes				
Bernanke, Reinhart, and Sack (2004)	Event study and macro/finance model with econometric model of yield curve	Japan, US	Yes		Yes	Yes		
Hanes (2006)	Model of Treasury yields as function of reserve levels	US	Yes					
Honda, Kuroki, and Tachibana (2007)	VAR model	Japan			Yes	No		
Kuttner and Posen (2001)	VAR model to test impacts of shocks in M0	Japan					No	No
Meier (2009)	Casual observation	UK	Yes	Yes				
Okina and Shiratsuka (2004)	Instantaneous forward rate (IFR) econometric yield curve model	Japan	No					

Note: M0=monetary base, US=United States, VAR=vector auto regression.
Source: Author’s compilation.

in the target level of the current-account balance at the BoJ from over 6 trillion yen to 10-15 trillion yen on 19 December 2001. This indicates that the strengthening of quantitative monetary easing was not perceived as sufficient stimulus to curb deflation, coupled with low economic growth”. This suggests that there was little independent contribution from quantitative

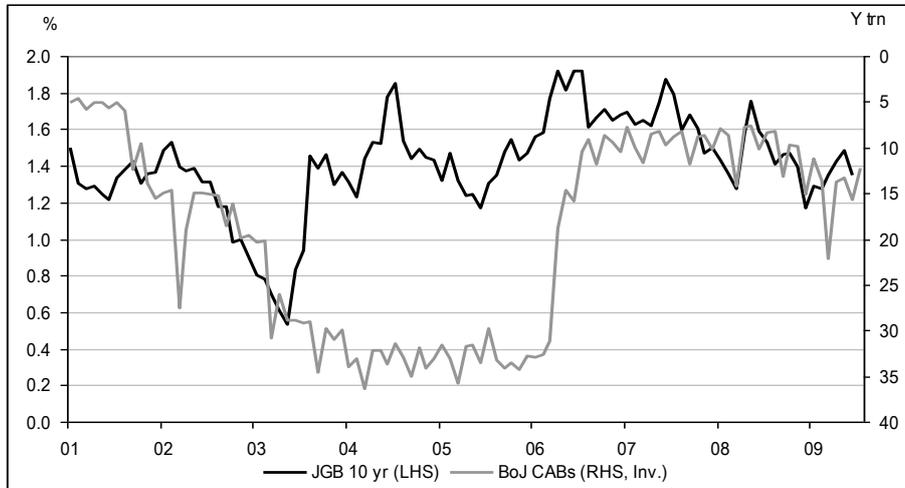
easing beyond that of the commitment effect, which did seem to flatten the yield curve.

There is some evidence that the ample provision of liquidity did ease banks' funding constraints and shrink credit spreads. Baba *et al.* (2005a) found a positive effect of increasing CAB levels on reducing the dispersion of bank credit spreads in the interbank market. They noted that as the BoJ had to fund successively higher CAB levels, it had to move further out along the yield curve to conduct its operations, which tended to flatten the yield curve. They concluded that both the commitment effect and quantitative easing probably tended to reduce credit spreads in the interbank market, although they were unable to quantify their relative contributions.

Figure 5 shows the relationship between the CAB level (inverted) and the 10-year JGB yield. The impact of the CAB levels on bond yields is not clear, as bond yields began falling in 2002 before CABs started to rise, and began rising again mid-2003, even though the CABs continued to rise until late 2004. Moreover, bond yields began to rise sharply in late 2005, well before the fall of the CABs in mid-2006. CABs have begun to rise again in 2009, but there has been little evident impact on bond yields.

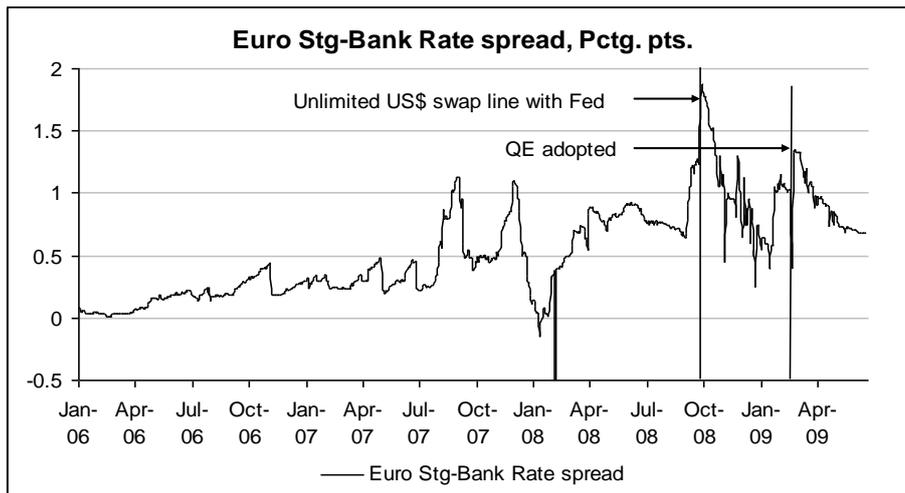
The Bank of England is the only major central bank to have adopted quantitative easing during the current global financial crisis, as it set a target of £75 billion for reserve deposits on 5 March 2009 and subsequently raised this to £125 billion on 7 May 2009 and again to £175 billion on 6 August 2009. Figure 6 shows the spread between the three-month sterling London interbank offered rate (Libor) and the base rate. The figure shows that the spread narrowed rapidly after 20 March 2009, although it is not clear if this was affected by other factors as well. This may provide some evidence of the effectiveness of quantitative easing in reducing credit spreads. The Bank of England's (BoE) QE policy was actually a mix of both quantitative easing and qualitative easing; although it targeted the level of reserve deposits, it accomplished this primarily through purchases of UK government bonds ("gilts") rather than short-term paper. Meier (2009) found these purchases to have been effective in lowering both gilt yields and interbank rate spreads.

Figure 5 JGB Yield and Bank of Japan Current Account Balances



Note: BoJ=Bank of Japan, CAB=current account balance, JGB=Japanese government bond, LHS=left-hand side, RHS=right-hand side.
 Source: CEIC Data Co. Ltd. database.

Figure 6 UK Interbank Interest Rate Spread and Monetary Policy Announcements



Note: QE=quantitative easing, UK=United Kingdom, US=United States.
 Source: Bank of England <http://www.bankofengland.co.uk/mfsd/iadb/Index.asp?first =yes&SectionRequired=I&HideNums=-1&ExtraInfo=true&Travel=Nix> (accessed 10 July 2009).

Regarding impacts on output and inflation, Bernanke, Reinhart, and Sack (2004) ran simulations of QE policies on simple macro models of the US and Japan. They found that increases in CAB levels did have positive impacts on output and prices in both countries, although, again, the impacts for Japan were much less than those for the US. Using a similar approach for Japan, Honda, Kuroki, and Tachibana (2007) found positive impacts on output but not on prices. They identified equity prices as the main channel by which the QE policy affected output, which implies that the portfolio-balance effect was the main transmission mechanism. However, the lack of impact on prices is puzzling, and does cast doubts on the validity of the model and the robustness of the conclusions.

Kuttner and Posen (2001) used a VAR model to test the impact of the monetary base on broad money and prices, and found no significant impact since 1990, which was not particularly surprising, given that the normal credit transmission mechanism was not functioning then. They did not find evidence that the QE policy tended to weaken the yen either. However, their results were somewhat limited by the fact that M0 had shown little volatility during the estimation period, since it preceded the BoJ's adoption of QE policy.

On the whole, the evidence for a significant impact of the QE policy in addition to the commitment effect on interest rates, output, and inflation looks limited. However, the evidence that the QE policy helps to ease tightness in credit markets appears to be stronger. As will be discussed in the next section, qualitative easing targeted at specific asset markets is probably a more efficient way to lower credit spreads. Strikingly, the Bank of Japan did not return to quantitative easing during the latest downturn, despite the fact that growth has been far weaker than it was in 2001-2002 during the previous recession. This at least suggests that the Bank of Japan does not have much confidence in its efficacy, aside from its role in easing stresses in the financial sector.

Qualitative Easing: Empirical research on the effects of qualitative easing

Table 4 Effectiveness of “Qualitative Easing”: Empirical Studies

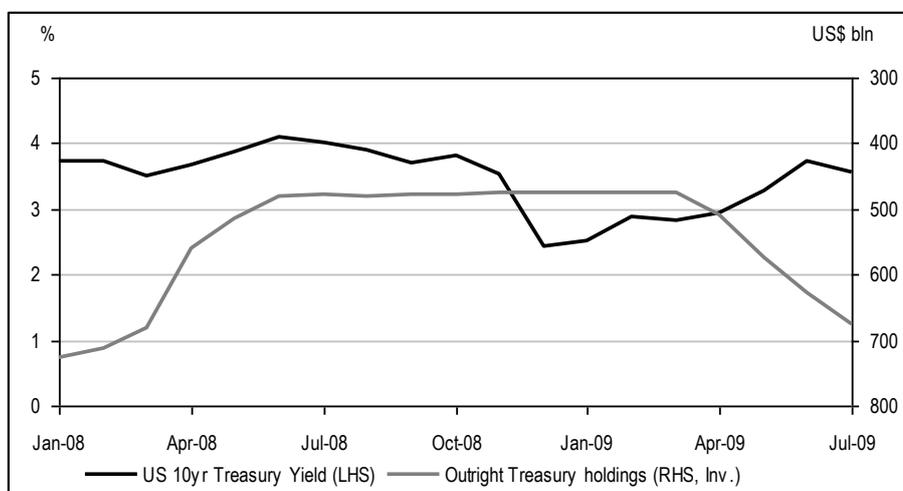
	Methodology	Country/ Region	Yield Curve	Credit Spreads	US\$ MM Spread
Bernanke, Reinhart, and Sack (2004)	Event study and macro/finance model with econometric model of yield curve	US	Yes		Yes
McAndrews (2009)	Econometric model of spread	US			
Meier (2009)	Casual observation	UK	Yes		
Oda and Ueda (2007)	Macro/finance model with econometric model of yield curve	US	No		
Yuan and Zimmerman (1999)	DGE model	Canada		No	

Note: DGE=dynamic general equilibrium model, MM=money market, UK=United Kingdom, US=United States.

Source: Author’s compilation.

is more limited (see table 4). Much of the analysis focuses on purchases of long-term government bonds, perhaps the logical first step toward unconventional purchasing operations. Shiller (1990) analyzed the attempts of the US Fed to influence the shape of the yield curve during the 1960s (“operation twist”), but was not able to find evidence that the effect of the policy was significant. However, this may be simply because the operation was not large enough. Bernanke, Reinhart, and Sack (2004) found that the announcement by the US Treasury in February 2000 that it would probably stop issuing 30-year bonds had a statistically significant impact in lowering yields on 20-year Treasury bond yields compared with Treasury bonds with shorter maturities. They also found evidence that purchases of US Treasury bills by the Japanese Ministry of Finance in 2003-2004 may have been consistent with a decline of bond yields of 50-100 basis points, but the evidence was not conclusive, as the contribution of other factors could not be ruled out, and the deviations could have been due to chance. They concluded on a positive note, however, stating that:

Figure 7 US Treasury Bond Yields and Federal Reserve Outright Treasury Holdings

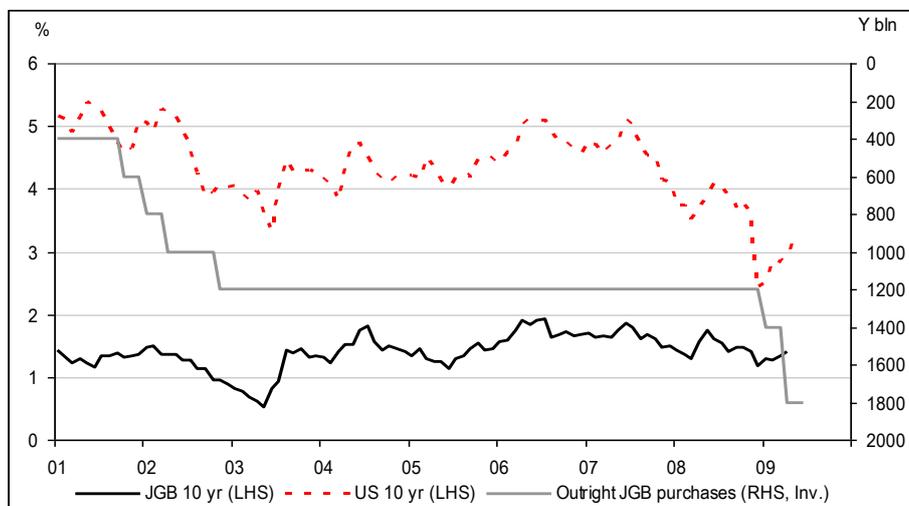


Note: LHS=left-hand side, RHS=right-hand side, US=United States.
Source: CEIC Data Co. Ltd. database.

If the Federal Reserve were willing to purchase an unlimited amount of a particular asset — say, a Treasury security — at a fixed price, there is little doubt that it could establish that asset's price. Presumably, this would be true even if the Federal Reserve's commitment to purchase the long-lived asset were promised for a future date (Bernanke, Reinhart, and Sack, 2004, p. 60).

Nonetheless, the Fed's recent experience with buying US Treasuries has not been obviously successful. In the six months since the beginning of 2009, the Fed's outright holdings of US Treasury securities rose by US\$172 billion (36%), but this did not stem a sharp rise in bond yields during that period, as the 10-year bond yield rose from 2.2% to 3.6% (see figure 7).

Of course, rates might have been even higher otherwise, but the Fed's basic goal of holding down mortgage loan rates was not achieved. Interestingly, the level of Fed holdings of Treasuries declined substantially between late 2007 and mid-2008, but this does not seem to have put any upward pressure on bond yields. Baba, Ho, and Hordahl (2009) also noted

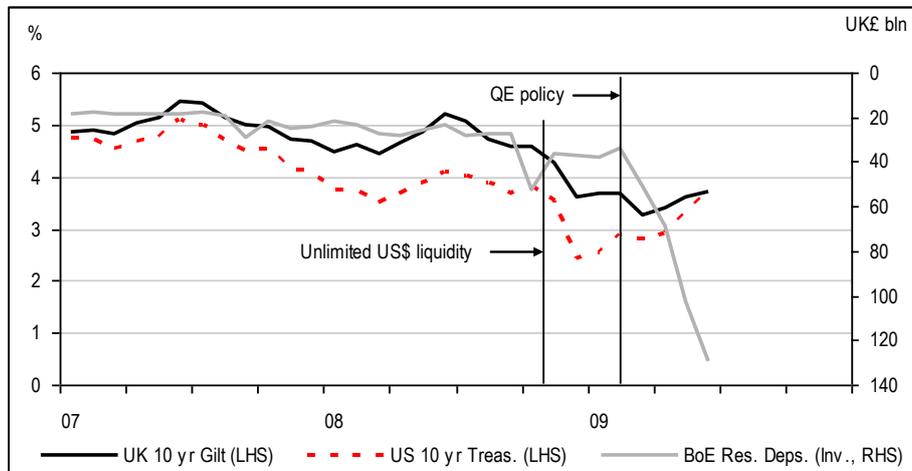
Figure 8 JGB Yields and Bank of Japan Outright Bond Purchases

Note: JGB=Japanese government bond, LHS=Left-hand side, RHS=Right-hand side, US=United States.

Source: CEIC Data Co. Ltd. database, Bank of Japan.

that declines in bond yields in response to bond purchase announcements by both the Fed and the BoE were very short-lived. These results probably should not be surprising in light of the huge size and liquidity of the US Treasury market (total value of US\$6.8 trillion in March 2009) relative to the Fed's purchasing operations, which were announced to total US\$300 billion, or 4.4% of the total.

As noted above, the Bank of Japan also significantly increased its outright purchases of JGBs during the period of the QE policy between August 2001 and October 2002. However, as was the case with quantitative easing, Oda and Ueda (2007) concluded that the BoJ's increased purchases of JGBs did not lead to a significant portfolio-rebalancing effect. Figure 8 shows that the increase in the level of outright purchases during period did lead the decline in 10-year JGB yields. However, this decline could also be attributed to the decline in US bond yields during the same period. Notably, Japanese bond yields rose in line with the increase in US bond yields from mid-2003, presumably reflecting the global economic recovery, even though outright

Figure 9 UK Government Bond Yield and BoE Reserve Deposits

Note: BoE=Bank of England, LHS=left-hand side, QE=quantitative easing, RHS=right-hand side, UK=United Kingdom, US=United States.

Source: CEIC Data Co. Ltd. database.

bond purchases remained high at ¥1.2 trillion per month. Even more suggestively, Japanese bond yields rose since December 2008, again in sympathy with US bond yields, even though the outright purchases were increased dramatically further to ¥1.8 trillion per month by February 2009. Therefore, the most one can say is that the purchases may have diminished the extent of the increase of bond yields, but it is difficult to determine the size of this impact. The large size and liquidity of the Japanese bond market suggests that operations of this kind would have to be large indeed to have a substantial and lasting effect.

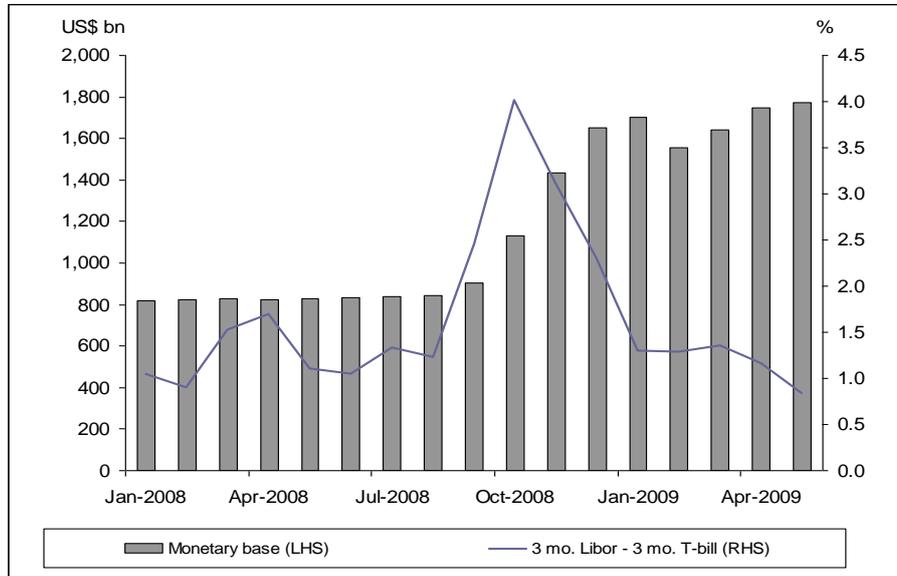
The Bank of England embarked on a large-scale program of purchasing UK government bonds (“gilts”) beginning in March 2009 in order to fund its target for central bank reserve deposits described above. Figure 9 shows the relationship between government bond yields and the level of reserve deposits. Its purchasing operations have been comparatively aggressive, as the BoE accumulated about 17% of total tradable government bonds in about four months (*Financial Times*, 2009). Nevertheless, bond yields still rose by about 30 basis points between March and July 2009, after the start of the

bond purchase program, so the effect looks somewhat limited. Taking into account relative movements of US and European bond yields over the same period, Meier (2009) estimated that four months after the announcement of the QE policy, it had lowered gilt yields by a range of at least 35-60 basis points, a significant, but not huge decrease.

Qualitative easing may be effective in reducing some credit-related financial stresses. For Canada, Yuan and Zimmerman (1999) used a dynamic general equilibrium model to analyze the effects of monetary easing and changes in required loan-to-deposit ratios on credit availability. They found that direct easing of loan standards was much more effective than conventional monetary easing in counteracting a credit crunch. McAndrews (2009) found that the Fed's TAF and central bank swap programs were effective in reducing spreads between the US (federal funds purchases and sales) and European (Eurodollar deposit) interbank markets. Figure 6 above shows that the announcement by the Bank of England on 13 October 2008 that it would provide unlimited dollar liquidity to the banking sector appears to have been the key factor in easing funding pressures in the interbank market at that time. We discuss the case of Bank of Korea's currency swaps in the section on developing economies below.

The Fed's recent qualitative easing moves appear to have had a significant impact on easing credit spreads of various kinds. For example, the "Ted" spread (the spread between the three-month Libor rate and the three-month Treasury bill rate) peaked at over four percentage points in November 2008, but began to fall rapidly thereafter (see figure 10). During this period the US monetary base roughly doubled in size to about US\$1.7 trillion as a result of the combined impacts of purchases under the TAF, CPFF, and other programs, plus the Fed swap arrangements with other central banks. It is difficult to identify the relative effects of these different programs, but the combined impact appears to have been substantial. Because banks were the major beneficiaries of these moves, it is reasonable to see this reflected in the Ted spread, which mainly indicates the market's assessment of risk in the banking sector.

Figure 10 Ted Spread and US Monetary Base

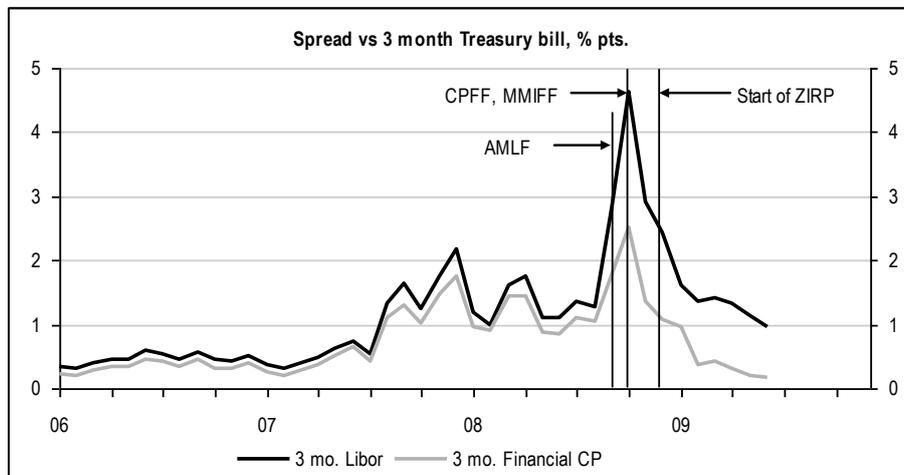


Note: LHS=left-hand side, RHS=right-hand side, US=United States.
 Source: CEIC Data Co. Ltd. database.

Spreads in the US money market and CP market also eased dramatically after the implementation of various Fed liquidity programs described above, including the AMLF in September 2008 and the MMLFF and CPFF in October 2008 (Capital injections into nine major US banks, announced on 14 October 2008, probably contributed to this easing effect as well). Figure 11 shows that spreads of both Libor and financial commercial paper over T-bill rates declined sharply beginning in November 2008, and have since largely normalized. The start of the ZIRP and the commitment effect in December 2008 probably had a further downward impact on spreads, although this is more difficult to confirm in terms of timing.

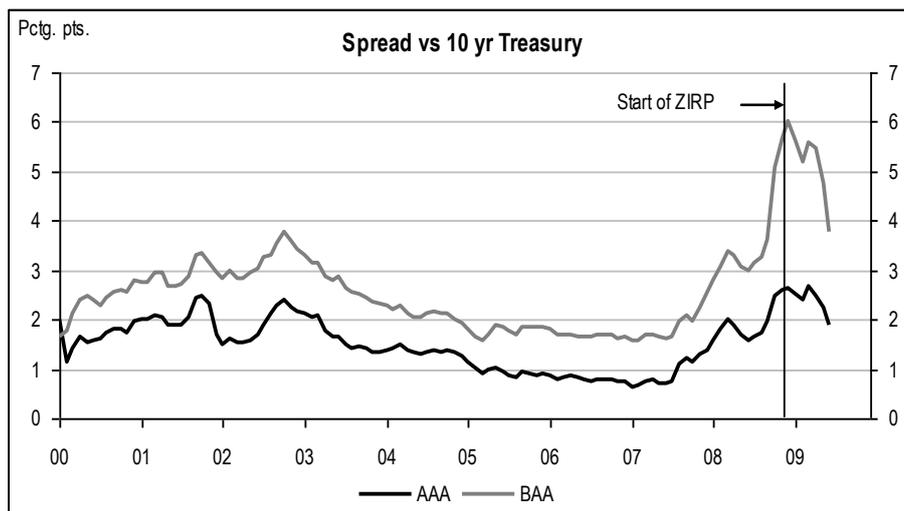
In contrast, spreads of corporate bond yields over those of US Treasury bonds did not peak until December 16 (see figure 12). This is precisely the day that the Fed announced the shift to the zero-interest-rate policy and the commitment to maintain it for “some time,” which is very strong evidence that this was the key factor, rather than the Fed’s balance sheet activity. This

Figure 11 US Money Market and CP Spreads and Fed Credit Easing Measures

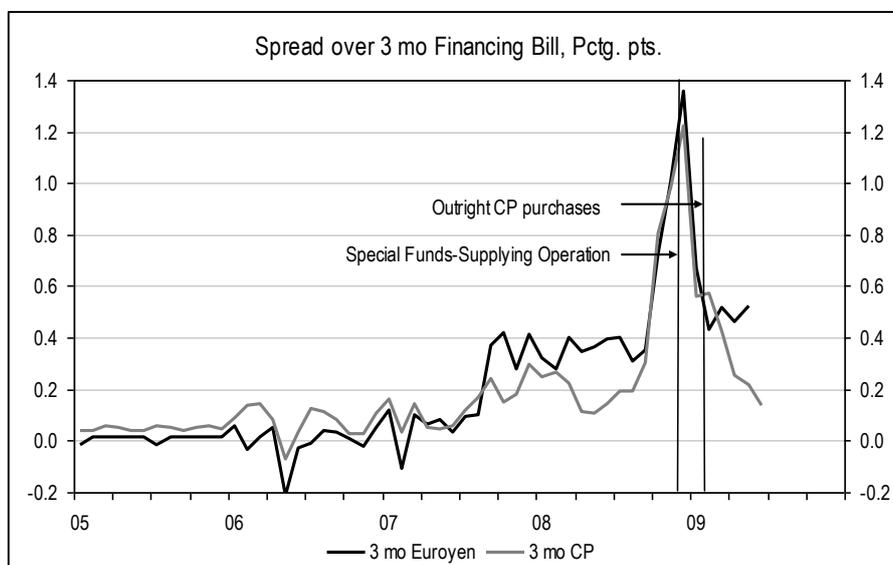


Note: AMLF=Asset-Backed Commercial Paper Money Market Fund Liquidity Facility, CP=commercial paper, CPFF=Commercial Paper Funding Facility, MMIFF=Money Market Investor Funding Facility, US=United States, ZIRP=zero-interest-rate policy. Source: CEIC Data Co. Ltd. database.

Figure 12 US Corporate Bond Yield Spreads and ZIRP Announcement



Note: US=United States, ZIRP=zero-interest-rate policy. Source: St. Louis Federal Reserve Bank FRED® economic database <http://research.stlouisfed.org/fred2/categories/22> (accessed 5 October 2009).

Figure 13 Japanese Euroyen Deposit and CP Spreads

Note: CP=commercial paper.

Source: Bank of Japan Times Series Data Search, [http://www.stat-search.boj.or.jp/ssi/cgi-bin/famecgi2?cgi=\\$nme_a010_en&obj_name=ST](http://www.stat-search.boj.or.jp/ssi/cgi-bin/famecgi2?cgi=$nme_a010_en&obj_name=ST) (accessed 10 August 2009).

suggests that rate expectations were more important for the non-financial corporate sector, rather than the direct effects of toxic items on the balance sheet (To be sure, the spread for AAA bonds did spike briefly higher in March 2009, but the spread for BAA bonds clearly peaked in mid-December).

The Bank of Japan also undertook a number of credit-easing measures, including “Special Funds-Supplying Operations to Facilitate Corporate Financing” (19 December 2008), outright purchases of commercial paper (22 January 2009), and outright purchases of corporate bonds (19 February 2009). Figure 13 shows that the spreads of Euroyen deposits and CP over financing bills declined markedly in the first three months of 2009. However, the spread for Euroyen deposits remained considerably more elevated than that for CP, indicating residual concerns about the financial position of Japanese banks.

These results suggest that qualitative easing or credit easing measures are

not very effective in affecting the level of government bond yields, but can be quite effective in reducing spreads of rates of other financial products over those of risk-free rates, especially short-term rates. This is particularly so when concerns about liquidity and solvency lead to a credit crunch that essentially prevents certain markets from functioning normally. In other words, the central bank can successfully unplug logjams arising from a scarcity of funds in a particular segment. However, there is little evidence that such measures can affect inflation expectations or the demand for credit at the macro level. Finally, these studies typically look at individual countries in isolation, and hence may miss spillover effects. For example, Fed policies implemented in US markets may have helped to relieve stress in overseas markets.

4. EXIT STRATEGY AND OTHER RISKS

Unconventional monetary policy measures that increase the size and/or riskiness of the central bank's balance sheet raise the possibility of large capital losses on those assets, potentially to the extent of making the central bank insolvent. A central bank can to some extent repair its losses by printing money. However, this is limited by its operational target of price stability, since printing too much money could cause inflation. Therefore, if its losses are large enough, presumably the government would have to recapitalize the central bank. This would require the issuance of new debt, which would tend to put further upward pressure on bond yields and possibly undermine the currency.

Another issue for unconventional monetary easing that is receiving increasing attention is that of the exit strategy, i.e., how to unwind the unconventional policy measures once the economy is ready to go back onto a "conventional" policy track. The central bank has to strike a delicate balance and reduce its balance sheet in a timely and non-disruptive way to avoid potential inflation risk on the one hand and an overly abrupt monetary-

tightening shock on the other. The key point is that the credit transmission mechanism does not function normally when the economy is in a liquidity trap, so that unconventional policies may lead to a very large expansion of the central bank's balance sheet without stimulating a commensurate increase in bank lending. However, once conditions in the financial sector normalize, the transmission belt could start up again, and bank lending could balloon rapidly, leading to unwelcome inflation pressure. Also, if the central bank holds large amounts of government bonds, it could suffer large capital losses on those bond holdings, which would undermine the central bank's capital position. Large-scale sales of such bonds could exacerbate capital losses in this situation. Moreover, if the central bank holds large amounts of illiquid assets such as asset-backed securities as a result of qualitative easing measures, it might find it very hard to reduce these holdings in a timely manner. Finally, if interest rates rise too rapidly as a result of rapid sales of assets, this could undermine the economic recovery.

A number of these issues are discussed in detail in Fujiki, Okina, and Shiratsuka (2001). One possible perverse effect would be that announcements by the central bank to buy government bonds would be perceived by the market as a loss of fiscal discipline, which could actually push up risk premiums and bond yields. They also argued that, if bond yields rise and the central bank suffers losses on its holdings of government bonds, it would have to sell more government bonds than it bought in order to reduce base money by the same amount, thereby leading to further upward pressure on bond yields and capital losses.

Bernanke (2009b) argued that it will be relatively easy for the Fed to wind down its balance sheet when the time comes, because: (i) many lending programs extend credit primarily on a short-term basis at above-normal market rates, so demand for them by banks and other institutions will dwindle once the economy recovers and credit market conditions normalize; (ii) the Fed can conduct reverse repurchase agreements against its long-term securities holdings to drain bank reserves; (iii) some reserves can be absorbed by the Treasury's Supplementary Financing Program; and (iv) the

Fed's ability to pay interest on reserve balances will encourage depository institutions to hold reserves with the Fed, rather than lending them into the federal funds market at a rate below the rate paid on reserves.

Of course, the central bank could always raise the reserve ratio if it found other means to decrease the level of reserves to be too disruptive. There are other possibilities as well. Bini, Smaghi (2009) suggested that the fiscal authority could issue debt securities and deposit the proceeds with the central bank. This would effectively transfer the liquidity previously created from the private to the public sector. Where allowed, the central bank could also issue such certificates, with essentially the same effect.

The Bank of Japan's experience of winding down the QE policy in 2006 was uneventful, which should provide some confidence on this subject. It managed to shrink its balance sheet dramatically by ¥39 trillion (25%) between February and May of that year without any obvious disruption of the markets. Roughly three-quarters of the reduction was accomplished by cuts of bills purchased, while the remainder came from sales of JGBs. JGB yields rose by about 35 basis points over that period, a measurable increase, but well within normal market fluctuations. Also, figure 3 above shows that the Fed has been successful in shrinking some of its lending programs fairly rapidly, including the foreign currency swap arrangements. However, the real test will come when it has to sell down its outright holdings of US Treasuries and other less-liquid securities.

5. ISSUES FOR IMPLEMENTATION IN DEVELOPING ECONOMIES

Analysis of the effectiveness of unconventional monetary policy so far has been conducted almost entirely on the US and Japanese economies, which are relatively closed, have large and well-developed domestic financial markets, independent central banks, and floating exchange rates. The question arises as to how relevant the experiences of these economies might

be for developing economies in Asia and elsewhere. Unfortunately, there is almost no research on this subject. One recent report that touches on this area is Ghosh *et al.* (2009).

Possible factors that could constrain the implementation of unconventional monetary policy measures in developing economies include:

- (i) an insufficiently developed government bond market that limits the central bank's ability to buy such bonds;
- (ii) an insufficiently developed corporate bond market, which limits its capacity to be a source of corporate funding even if it is functioning normally;
- (iii) legal restrictions on central bank purchases of government assets and other securities;
- (iv) a high degree of "dollarization" of domestic liabilities that limits the lender-of-last-resort function of the central bank;
- (v) an exchange rate peg that limits monetary policy flexibility;
- (vi) insufficient credibility on inflation fighting that might cause adoption of unconventional policy measures to be perceived by the market as a loss of inflation discipline; and
- (vii) related to (vi) above, vulnerability of the currency to capital outflows.

Calvo (2007) noted that the central bank of an emerging market may need to switch policy modes during periods of "sudden stops," i.e., foreign-currency-based capital outflows. Specifically, he recommended that it should switch to exchange rate targeting rather than using the policy interest rate as a target. However, he did not discuss exchange rate policy in conjunction with other unconventional policy measures. As noted above, a policy of deliberate currency depreciation could be an effective macroeconomic stabilization tool.

In countries with large stocks of foreign short-term capital inflows, the currency could react very sensitively to changes of market perception about monetary policy and inflation risk, thereby complicating the task of the

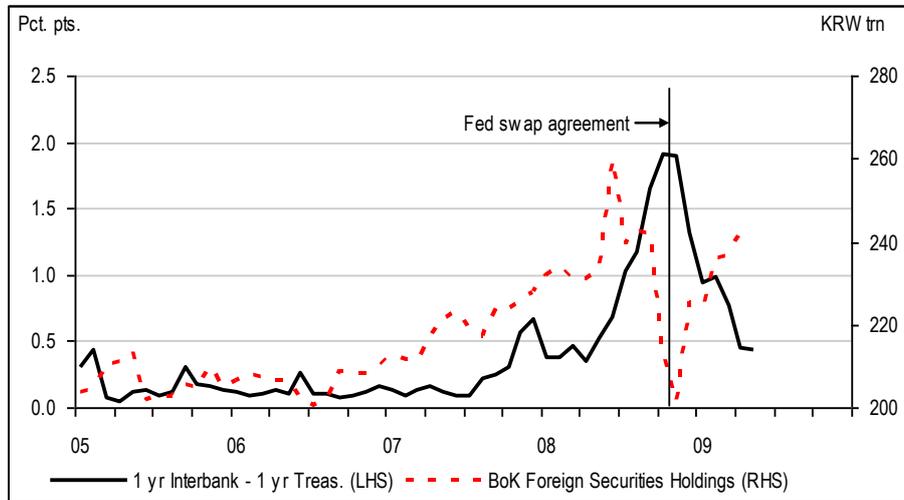
monetary authorities. Of course, if an economy is experiencing deflation, some currency depreciation could be beneficial, but the risk of overshooting is serious. This risk points to the need for high levels of foreign exchange reserves as an insurance policy, both for foreign exchange intervention and for supplying foreign currency liquidity. Ghosh *et al.* (2009) advocated provision of foreign currency liquidity in situations where a sharp depreciation of the currency could be damaging because of large domestic liabilities denominated in foreign currencies. For example, if domestic banks cannot roll over existing sources of foreign currency credit, the central bank could step in to provide such credit to maintain domestic credit lines and draw out the adjustment process. This has been an important measure in countries such as the Republic of Korea, as is discussed below.

Regarding quantitative easing policy (and presumably credit easing measures as well), Ghosh *et al.* (2009, p. 17) argued that "... QE should only be attempted by countries with a history of low inflation and macroeconomic stability, with central bank independence and credibility". Again, an exchange rate peg or concerns about exchange rate instability would limit policy options in this area.

A more general issue is that the dichotomy of "standard" and "unconventional" monetary policies does not necessarily apply to emerging markets, where markets are typically less developed and the monetary policy transmission mechanism works less smoothly. Another issue is whether policies have impacts on creating winners and losers. It is desirable to have neutrality in this dimension in order to avoid undesirable political implications of central bank policies.

In Asian emerging economies, unconventional measures have been adopted by the Bank of Korea, Monetary Authority of Singapore (MAS), Reserve Bank of India (RBI), and Central Bank of the Republic of China (CBC). Perhaps the most significant unconventional policy measures in the region outside of Japan have been those involving provision of foreign currency liquidity via the Fed swap arrangements with other central banks in order to offset the shortage of US dollars arising from capital outflows. For

Figure 14 Korean Money Market Spreads and BoK Foreign Reserve Holdings



Note: BoK=Bank of Korea, LHS=left-hand side, RHS=right-hand side.
Source: CEIC Data Co. Ltd. database.

example, the Fed and the Bank of Korea announced the implementation of a US\$30 billion swap agreement on 29 October 2008. This appears to have been effective in easing the shortage of dollar funds in the Korean market. Figure 14 shows that the spread between the Korean one-year interbank rate and the one-year Treasury bill rate spiked upward from mid-2008 at the same time that foreign securities holdings (presumably mainly US Treasuries) of the Bank of Korea dropped sharply. However, once the holdings of foreign securities began to rise again in December, presumably as a result of the loan by the Fed, the spread shrank rapidly again. It appears that the Bank of Korea (BoK) made full use of the Fed's swap line, since total foreign securities holdings rose by ₩40.8 trillion (roughly US\$29 billion) during that period. The Bank of Korea also significantly expanded its won-yen swap agreement with the Bank of Japan from US\$3 billion equivalent to US\$20 billion equivalent, and established a won-yuan swap with the People's Bank of China of up to CNY180 billion, although it seems not to have made use of these.

The Bank of Korea has taken a number of other unconventional actions, including broadening the list of eligible counterparties and collateral for repurchase operations, providing funding support to those financial institutions contributing to the Bond Market Stabilization Fund, and providing funding support to the Bank Recapitalization Fund in order to facilitate banks' expansion of their equity capital (Bank of Korea, 2009a). It also contributed funds to the Korea Credit Guarantee Fund to enable it to offer payment guarantees for the principal and interest of the loans (up to 10 trillion won) provided to the Fund through the Korea Development Bank, expanded the range of firms qualified for foreign currency loans secured by export bills from small and medium enterprises to all enterprises in order to encourage foreign domestic banks in the Republic of Korea to finance export trade (Bank of Korea, 2009b).

The MAS was the only other central bank in the region aside from the Bank of Japan, the Bank of Korea, and the Reserve Bank of Australia to establish such a swap line with the Fed. The MAS's holdings of foreign securities rose by about US\$7 billion in November of 2008, suggesting that it made some use of the Fed swap line, but this is not conclusive. However, interest rate spreads were much lower than in the Republic of Korea, so the impact of the increase in reserves on spreads is not obvious.

The RBI adopted a number of unconventional measures aimed at increasing the availability of both rupee and foreign currency liquidity. Unconventional measures aimed at expanding rupee liquidity included a special repo window under the liquidity adjustment facility for banks for lending to mutual funds, non-bank financial companies, and housing finance companies, and a special refinance facility that banks can access without any collateral. The RBI also set up a special purpose vehicle to provide liquidity support to non-banking financial companies (Reserve Bank of India, 2009). However, the degree of unconventionality of these measures was modest.

The Central Bank of the Republic of China (Taipei, China) also adopted a number of unconventional measures in September and October 2008, including expanding the eligible counterparties for its repo operations;

extending the term of such operations from 30 days to 180 days; expanding eligible collateral to include certificates of deposit; and linking the interest rates on central bank reserve deposits to market rates (CBC, 2008a and 2008b). These operations seem to have been effective in reducing interbank spreads relative to policy rates by about 30-40 basis points during that period.

6. CONCLUSION

Once interbank rates fall to zero, a central bank must rely on other “unconventional” means to impart further easing stimulus to the economy. Moreover, even if interbank rates are still positive, the existence of a credit crunch may impair the normal transmission mechanism of monetary policy, calling for unconventional measures to break the logjam. Unconventional monetary policy measures encompass three broad categories: (i) commitment effect, i.e., commitments by the central bank to maintain very low interest rates for a certain period, either conditionally or unconditionally; (ii) quantitative easing, i.e., targeting the level of current account balances of the central bank; and (iii) qualitative or credit easing, which involves purchases of targeted assets to lower rates and/or increase liquidity in the target market.

The empirical literature examining the effectiveness of unconventional monetary policy is still limited. Moreover, a number of studies are based on simulations using macro models, so their conclusions are only as reliable as the models themselves. Nonetheless, some broad lessons can be drawn. First, most studies of the commitment effect (or duration effect) suggest that statements by a central bank regarding the duration of a policy of very low or zero interest rates do provide new information to the market and tend to pull down longer-term interest rates. However, the inevitable uncertainty regarding the future course of the economy and monetary policy means that the impact of such measures tends to be seen mainly in shorter-term interest rates of, say, one- to two-year maturity, while the impact on longer-term rates is less clear.

The literature on the effects of quantitative easing (QE) monetary policy is less conclusive, especially when one accounts for other announcements by the central bank. The most definitive studies, e.g., Baba *et al.* (2005b) and Bernanke, Reinhart, and Sack (2004), do not rule out some influence, but find it to be secondary to that of the commitment effect. Some studies using VAR models have found a transmission effect to the real economy via the portfolio-balancing effect, e.g., on equities (Honda, Kuroki, and Tachibana, 2007), but the results do not necessarily seem convincing. However, there is evidence that quantitative easing reduced spreads in the interbank market.

Formal investigations of qualitative easing (credit easing) policy are limited, since the examples of this kind of policy are few, at least until recently. The longest-running example is the Bank of Japan's deliberate use of outright purchases of Japanese government bonds as a policy tool, which began in 2001 and was expanded in late 2008 and early 2009. The basic conclusion of the literature is that the impact on longer-term bond yields of such purchases was limited. This should not be surprising, in view of the large size of the government bond market in comparison with the size of the operations of the central bank and the impacts of many other factors, especially longer-term perceptions of the outlook for the economy and inflation. Although there is no theoretical limit to the ability of the central bank to purchase assets, practical considerations — mainly those related to the need to sell those assets later on as part of the exit strategy from unconventional policy — seem to limit the flexibility of the central bank in this area. It seems that the size of the market has to be smaller relative to the size of the operations for such operations to have an impact. Other kinds of asset purchase operations do seem to have been more successful. These include the foreign exchange swap operations conducted by the US Federal Reserve and other central banks (notably the Bank of Korea in Asia) and outright purchases of corporate paper. This suggests that central banks can use such policies successfully to deal with blockages and credit crunches in specific markets. However, for the same reason, intervention in smaller markets may also entail greater risks for the exit strategy.

Recent developments seem to support these general conclusions. The Fed's announcement of the zero-interest-rate policy and its commitment to maintain it for an extended period does seem to have been successful in lowering short-time rates and even corporate credit spreads. However, attempts by the Fed, the Bank of England, and the Bank of Japan to keep government bond yields from rising significantly look unsuccessful. On the other hand, a number of central banks have been successful in lowering spreads in interbank, commercial paper, and corporate bond markets.

Some of the main concerns regarding unconventional policy center on what to do when it has achieved its purpose and the need for such policy ends, i.e., the exit strategy. Too rapid tightening of policy could stifle an economic recovery, but inflation risks could arise if the monetary base is not reduced in a timely fashion. Large-scale sales of government bonds could push up bond yields in an undesirable way. The greatest concerns center on large-scale purchases of illiquid assets, such as asset-backed securities, which would be difficult to unwind in a short period of time. The risk of losses on the central bank's balance sheet also needs to be taken into account. However, central banks have a number of tools at their disposal to limit such risks. Also, the Bank of Japan managed to exit from quantitative easing in 2006 without any great difficulty.

What is the relevance of unconventional monetary policy for Asian economies aside from Japan? Although three other economies have seen interbank rates fall to nearly zero — Hong Kong, China; Singapore; and Taipei, China — only Singapore adopted unconventional measures, and that was chiefly related to its use of the Fed's swap line for US dollar reserves. This may reflect a judgment that it was easier simply to wait for a rebound of exports. However, if growth of US consumption slows structurally, this may force Asian economies to put greater reliance on unconventional monetary policy measures during future downturns.

The need to deal with credit crunches of various kinds even when interbank rates are still positive is probably more relevant for Asian economies. During the current global financial crisis, Asian economies have

mostly avoided a severe credit crunch of the kind afflicting the US and European economies, since financial sector losses have been much less. However, the Korean banking sector was unusually exposed, due to its high loan-to-deposit ratio and dependence on foreign currency wholesale funding. As a result, the Bank of Korea was most active in adopting unconventional measures, and its use of the swap line from the Fed seems to have been successful in easing the dollar shortage and bringing down interbank rates. The Bank of India also successfully implemented a number of policies to ease liquidity shortages.

APPENDIX

A1. Glossary of Selected Abbreviations

AMLF: Asset-Backed Commercial Paper Money Market Fund Liquidity Facility. A lending facility that provides funding to United States (US) depository institutions and bank holding companies to finance their purchases of high-quality asset-backed commercial paper (ABCP) from money market mutual funds under certain conditions.

CABs: Current Account Balances — i.e., reserve deposits of the central bank.

CPFF: Commercial Paper Funding Facility. A facility that complements the Federal Reserve's existing credit facilities to help provide liquidity to term funding markets.

MMIFF: Money Market Investor Funding Facility. A facility to support a private-sector initiative designed to provide liquidity to US money market investors.

QE: Quantitative Easing.

PDCF: Primary Dealer Credit Facility. A lending facility to improve the ability of primary dealers to provide financing to participants in securitization markets.

TAF: Term Auction Facility. Auction for Federal term funds from the discount window.

TALF: Term Asset-Backed Securities Loan Facility. A facility that will help market participants meet the credit needs of households and small businesses by supporting the issuance of asset-backed securities collateralized by student loans, auto loans, credit card loans, and loans guaranteed by the Small Business Administration.

TSLF: Term Securities Lending Facility. Access to Fed discount window for primary dealers.

ZIRP: Zero-interest-rate policy.

ZLB: Zero lower bound on interest rates.

A2. Major Monetary Policy Announcements

Fed	12 Dec. 2007	Term Auction Facility (TAF)
	12 Dec. 2007	Reciprocal currency arrangements with ECB and Swiss National Bank (swap lines)
	11 Mar. 2008	Term Securities Lending Facility (TSLF)
	16 Mar. 2008	Primary Dealer Credit Facility (PDCF)
	18 Sep. 2008	Reciprocal currency arrangements with Bank of China, BoE, and BoJ (swap lines)
	19 Sep. 2008	Asset-Backed Commercial Paper Money Market Fund
	7 Oct. 2008	Liquidity Facility (AMLF)
	21 Oct. 2008	Commercial Paper Funding Facility (CPFF)
	29 Oct. 2008	Money Market Investor Funding Facility (MMIFF)
		Reciprocal currency arrangements with Banco Central do Brasil, BoK, MAS, Banco de Mexico (swap lines)
	25 Nov. 2008	Term Asset-Backed Securities Loan Facility (TALF)
	16 Dec. 2008	Zero-interest-rate policy and commitment to maintain it for a considerable period
	29 Jan. 2009	Creation of “excess balance accounts” to allow payment of interest on excess balances
	10 Feb. 2009	Public-Private Investment Fund on an initial scale of up to US\$500 billion
	18 Mar. 2009	Increased purchases of mortgage-backed securities, agency bonds, and Treasuries
	25 Jun. 2009	TSLF operations backed by Schedule 1 collateral ended as of 30 June.

BoJ	31 Oct. 2008	Pay interest on excess reserve balances
	19 Dec. 2008	Increase outright bond purchases from ¥1.2 tr/mo to ¥1.4 tr/mo
	19 Dec. 2008	Introduction of “Special Funds-Supplying Operations to Facilitate Corporate Financing”
	19 Dec. 2008	Outright purchases of commercial paper
	19 Feb. 2009	Outright purchases of corporate bonds
	18 Mar. 2009	Increase outright bond purchases from ¥1.4 tr/mo to ¥1.8 tr/mo
BoE	21 Apr. 2008	Special Liquidity Facility (swap mortgage-backed securities for T-bills)
	18 Sep. 2008	Reciprocal currency arrangement with Fed (swap line)
	13 Oct. 2008	Unlimited lending of US liquidity to banking system
	19 Jan. 2009	Asset Purchase Facility of £50 billion
	5 Mar. 2009	Quantitative easing target of £75 bn for bank reserves
	7 May 2009	Quantitative easing target of £125 bn for bank reserves
ECB	6 Sep. 2007	Fixed-rate auction with full allotment
	20 Jan. 2009	Acceptance of asset-backed securities as collateral for operations
	7 May 2009	Outright purchases of covered bonds
	24 Jun. 2009	Fixed-rate auction with full allotment of one-year loans (€442 bn)
BoK	17 Oct. 2008	Introduction of a competitive auction swap facility for foreign exchange
	29 Oct. 2008	Broadening of eligible collateral for repurchase operations
	30 Oct. 2008	Reciprocal currency arrangement with US Federal Reserve (swap lines)
	12 Dec. 2008	Expansion of yen-won swap agreement with BoJ from US\$3 billion to US\$20 billion
	12 Dec. 2008	Establishment of yuan-won swap agreement with People’s Bank of China of up to CNY180 billion
	30 Mar. 2009	Contribution of funds to the Korean Development Bank and Korea Credit Guarantee Fund
MAS	30 Oct. 2008	Reciprocal currency arrangement with US Federal Reserve (swap lines)
RBI	16 Sep. 2008	Increasing of borrowing limit for banks of 1% of net domestic liabilities
	6 Dec. 2008	Institution of a rupee-dollar swap facility for banks with overseas branches
	6 Dec. 2008	Reduction of risk weights on lending to certain sectors

Note: BoE=Bank of England, BoJ=Bank of Japan, BoK=Bank of Korea, ECB=European Central Bank, MAS=Monetary Authority of Singapore, RBI=Reserve Bank of India.

Source: US Federal Reserve Board, BoJ, BoE, ECB, BoK, MAS, and RBI.

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