

## **Unconventional Choices for Unconventional Times** Credit and Quantitative Easing in Advanced Economies

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*With policy rates close to the zero bound and the economies still on the downslide, major advanced-country central banks have had to rely on unconventional measures. The measures have differed considerably in their scope, and have inter alia included broad liquidity provision to financial institutions, purchases of long-term government bonds, and intervention in key credit markets. Taken collectively, they have contributed to the reduction of tail risks following the bankruptcy of Lehman Brothers, although some measures are proving to be more successful than others. Going forward, developing clear and effective exit strategies from exceptional monetary policy actions will be central to ensuring a smooth return to normal market functioning.*

All happy families are alike;  
every unhappy family is unhappy in its own way.

*Leo Tolstoy*

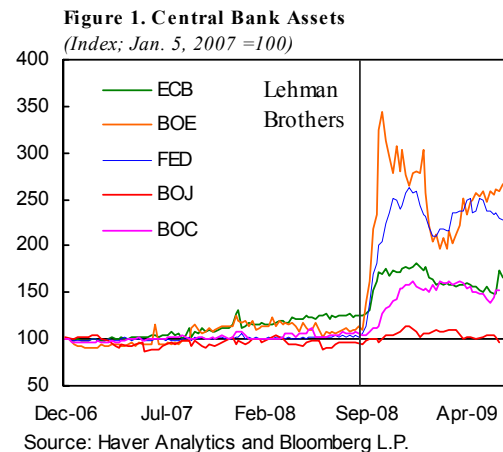
### **I. INTRODUCTION**

1. For several months now, G-7 policy rates have been within the narrow range of 0-1 percent. With the distress in financial markets impairing transmission from low policy rates to easy credit to the real economy even as the global recession was deepening, the major central banks have found it necessary to resort to unconventional measures.
2. In the early phases of the financial crisis, the response of central banks was largely aimed at providing liquidity support to banks faced with funding shortages and a sudden drying up of securitization markets. However, as the extent of the crisis and its real impact became clear, policies increasingly turned to a combination of interest rate cuts, particularly as inflationary concerns eased, actions to support credit flows, and measures to reduce systemic risks from failing institutions. Major central banks eased policy rates to limit the direct impact of the crisis on the economy and to alleviate the risks of an adverse feedback loop between the real and financial sectors. With the United States being the epicenter of the crisis, the Fed in particular has been extremely proactive and aggressive in cutting policy rates, lowering them by a cumulative 500 basis points since the beginning of the crisis to close to the zero bound. Other major central banks, including the ECB and the Bank of England, also cut rates, although at a somewhat slower pace than the Fed.
3. Policy rate reductions, however, had a limited impact on financial conditions. While real policy rates were substantially lower than before the crisis, reduction in inflation—most pronounced in headline CPI, but also evident in core measures and expectations—offset nominal cuts to some extent. Moreover, in many credit markets, policy rate cuts did not translate fully into lower borrowing rates. Financial disruptions weakened the monetary

transmission mechanism, with banks tightening lending standards. Many traditional funding sources for financial institutions and markets dried up, and banks and other lenders found their ability to securitize credit greatly constrained. As a result, despite the rate cuts, overall financial conditions were much tighter than before the crisis, with borrowing rates, especially for corporates, at elevated levels, and limited access to credit.

4. With squeeze on liquidity tightening and credit intermediation remaining impaired even as they approached the zero bound on policy rates, major central banks broadened the range of their activities. First, they dramatically increased the scope of their liquidity operations. Second, they increasingly acted to provide direct support to credit markets. Balance sheets of central banks expanded sharply, particularly following Lehman's bankruptcy (Figure 1). In the case of the Fed, this included *inter alia* providing a backstop for the commercial paper market, money market mutual funds, and the market for asset-backed securities, including those backed by mortgage lending. Indeed, following the Lehman event, the Fed's balance sheet grew from around 6 percent of GDP (\$940 billion) to a high of around 15 percent of GDP (\$2.3 trillion) at the end of 2008. Over the same period, the ECB's balance sheet expanded by around 45 percent, or 6½ percent of the euro area GDP. While these measures have been broadly effective in reducing tail risks following the intensification of the crisis in Fall 2008, some have been more successful than others.

5. This paper examines the nature and scope of various monetary policy actions, including the role of conventional and unconventional approaches, to assess their effectiveness in alleviating financial market pressures and enable sustainable recovery. Section II examines the menu of options for unconventional tools of monetary policy. Section III discusses the approaches pursued by major advanced country central banks to resolve the crisis. Section IV provides a discussion of the effectiveness of these approaches, by examining their impact on key financial market indicators. Section V looks into the issues relating to the exit from large-scale central bank interventions. Section VI contains concluding remarks.



## II. OPTIONS FOR UNCONVENTIONAL MONETARY POLICY

6. When policy rates are close to the zero bound, central banks can provide additional monetary stimulus through four complementary means.<sup>1</sup> First, they could commit explicitly to keeping policy rates low until the recovery firmly takes hold, with a view to guiding long-term interest rate expectations. Second, monetary authorities could provide broad liquidity to financial institutions to give them resources to on-lend to businesses and consumers. Third, central banks could seek to affect the level of long-term interest rates across a wide range of financial assets, independent of their risk, by lowering risk-free rates through the purchase of treasury securities. Fourth, they could intervene directly in impaired credit markets by providing loans to non-financial corporations, by purchasing private assets, or by furnishing credit linked to acquisition of private-sector assets—e.g., when investors have to post targeted assets as collateral to obtain loans from the central bank.<sup>2</sup>

7. These approaches differ in their mechanics and economics.

- An explicit commitment to keeping short-term interest rates low is aimed at anchoring market expectations that monetary stimulus will not be withdrawn until durable recovery is in sight. A commitment to keeping short-term interest low should keep inflation expectations from declining, preventing a rise in real interest rates and bolstering demand.
- Liquidity to financial institutions can be provided through existing or new facilities. Frictions in term money markets—when heightened concerns about counterparty risk, strains on liquidity, or shortage of acceptable collateral constrain the banks’ ability or willingness to lend, including to each other, beyond the shortest maturities—may necessitate going beyond traditional open-market operations and discount window lending. Central banks could offer liquidity to financial institutions at longer maturities, including collateralized by assets whose markets are temporarily impaired. They can also provide access to their liquidity facilities to a wider set of financial institutions when their market financing is disrupted. With such enhanced liquidity support, the increase in the monetary base is determined endogenously by the banking system, based on banks’ preference for liquidity and thus on the state of stress of the banking system. By enlarging the pool of the collateral accepted for refinancing

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<sup>1</sup> Box 1 discusses various terms used to describe unconventional monetary policies, including *quantitative easing* and *credit easing*.

<sup>2</sup> The list is not exhaustive. For example, for a small open economy experiencing an isolated downturn, pushing down the value of its currency has been advocated. Such policy would clearly be unwelcome at the time of a global recession. Also, after a deflationary shock, real interest rates are likely to be lower for a given policy rate under price-level-path targeting, thus providing more stimulus to the economy (Decressin and Laxton, 2009). However, switching to a different monetary policy regime in the middle of a crisis is hardly feasible.

operations of the central bank, financing by banks to certain sectors is facilitated and should be reflected in the credit spreads that banks charge to the corporate sector.

- Purchasing longer-term government securities is aimed at flattening the yield curve. This mechanism may be employed when liquidity provision at the short end and (explicit or implicit) commitment to keep policy rates low does not translate into lower long yields. Since long-term treasuries serve as benchmarks for pricing a variety of private-sector assets, it is expected that yields on privately issued securities would decline in parallel with those on government bonds. In addition, banks could use extra reserves received in exchange for treasuries to extend new credit. That said, in the context of impaired financial conditions, banks may choose to keep the additional liquidity at the central bank, even when reserves earn low or zero interest.
- Credit easing involves direct intervention in impaired credit markets. It addresses liquidity shortages and spreads in certain market segments through the purchase of commercial paper, corporate bonds and asset-backed securities. Alternatively, the central bank can provide credit to financial institutions or other investors for the purpose of purchasing eligible private securities. One mechanism to make certain the funds are used for the intended purpose is to require that the eligible securities be posted as collateral, with overcollateralization protecting the central bank against losses and ensuring the investor has some skin in the game. Credit easing can generally be useful not only at near-zero, but also at above-zero levels of the short-term nominal interest rate if relevant markets are disrupted.

### Box 1. Nomenclature of unconventional measures

The discussion of unconventional approaches is often rendered confusing by inconsistent terminology. In particular, the debate is frequently couched in terms of *quantitative easing* (QE) vs. *credit easing* (CE). However, there are no generally accepted definitions for these two terms. Moreover, various choices cannot be reduced to just two options. While the main text introduces our taxonomy of measures, this box discusses commonly used phraseology.

Japan undertook a variety of unconventional policies between 2001 and 2006 under the heading of *quantitative easing*. A key feature of that approach was targeting the amount of excess reserves of commercial banks, primarily by buying government securities, and most commentators equate this feature with QE.

Fed's Chairman Bernanke (2009) contrasted that experience with the Fed's current approach, which he classified as *credit easing* (CE). He defined credit easing to encompass all Fed's operations to extend credit or purchase securities. Bernanke stressed that the focus of CE was on individual markets—and hence the composition of the Fed's balance sheet, with its size being largely incidental, as opposed to the emphasis on the size under QE.

Subsequently, however, many commentators started using the term QE to mean purchases of long-term government securities and CE to mean acquisition of private assets, with agency bonds and mortgage-backed securities falling into a somewhat gray area. On the other hand, Buitert (2008) defined quantitative easing as operations to expand the monetary base and coined the term “qualitative easing” to mean a shift in the composition of central bank assets (toward less liquid and riskier ones) holding constant their total size.

The Bank of Canada (2009) refers to the purchase of government or private securities financed by creation of reserves as QE and to the acquisition of private assets in certain key markets as CE. Defined in this way, the two approaches are not mutually exclusive. Specifically, credit easing may or may not result in central bank balance sheet expansion depending upon whether its impact on reserves is sterilized. To the extent we use the terms QE and CE in this note, we employ the Bank of Canada's definitions.

BoE's Governor King (2009) made a distinction between “conventional unconventional” policy—purchases of highly liquid assets, such as government bonds, to boost the supply of money; and “unconventional unconventional” measures, aimed at improving liquidity in certain credit markets through targeted asset purchases. The former corresponds to the more conventional way to conduct quantitative easing, while the latter meets our definition of credit easing.

The ECB has eschewed QE and CE labels, and has dubbed its approach—centered on ample liquidity provision to Eurozone banks—*enhanced credit support* (Trichet, 2009). While the ECB has until very recently stayed away from purchasing public and private assets, full-allotment auctions have resulted in an expansion of the ECB's balance sheet and the commercial banks' excess reserves.

8. Each approach has advantages and drawbacks.
- Commitment to keep interest rates low for an extended period of time is easy to announce. It is particularly useful when policy uncertainty is high, and would likely encourage long-term investment. However, its effectiveness hinges on credibility, and has value only to the extent that it restricts future options. If inflationary pressures erupt earlier than expected, both reneging on the commitment and sticking to it while tightening is clearly called for would damage the central bank's reputation.
  - Boosting bank liquidity can be implemented easily as it relies on the ordinary channel of credit creation; it does not expose the central bank to considerable credit risk; and it reduces the risk of bank runs as it provides ample liquidity to financial institutions. If a target is set for bank reserves, the stance of monetary policy is easy to monitor and communicate. However, it may not translate into credit to households and firms if financial intermediaries are short of capital and seek to deleverage their balance sheets.
  - Purchases of long-term securities, particularly treasuries, are familiar operations with minimal credit risk. They send a clear signal of the central bank's desire to lower long-term rates—and may also be seen as a way to commit to an accommodative stance for an extended period, as such operations will take time to unwind. However, these purchases may not have a significant impact if they account for a small share of a deep government bond market. In fact, if monetization of fiscal deficits is perceived as reducing discipline, long rates may rise reflecting higher inflation expectations and risk premia.<sup>3</sup> Moreover, even if treasury yields do go in the desired direction, this may not affect much risky yields as heightened risk aversion reduces substitutability between government and private assets. In addition, buying treasuries at the bottom of the cycle exposes the central bank to capital losses once yields eventually go up as the economy recovers unless it holds them to maturity.
  - Direct credit provision may be more effective than going through banks when banks or transmission channels are broken; it may also have a signaling value—demonstrating through more aggressive and unconventional action that the central bank is ready to go to great lengths to revive the economy. The central bank can be selective, targeting particularly important and distressed markets. However, it presents logistical challenges, exposes the central bank to credit risk, and gives it a role in credit allocation. This intervention could distort relative prices and hurt

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<sup>3</sup> While higher inflation expectations are not undesirable following a deflationary shock, moving them up through higher fiscal deficits is hardly an ideal mechanism.

commercial bank profitability, even though risk-sharing mechanisms have been designed to address this concern.

### III. MEASURES TAKEN BY G-7 CENTRAL BANKS<sup>4</sup>

9. Since the early days of the financial crisis, advanced country central banks have taken resolute steps to enhance liquidity provision to the financial system (Table 1). Their initial reaction was to dramatically increase the size of liquidity operations. This was followed by steps to broaden the scope of current operations and introduction of new ones to address specific stresses. In particular, to alleviate stress in term markets, central banks extended the maturity of their lending operations. To help overcome market fragmentation and shortage of high-quality collateral triggered by a flight to quality, they expanded the list of eligible collateral for repo operations. The European Central Bank—which even before the crisis had the broadest access to its liquidity facilities and the least restrictive collateral rules—was at the forefront of these efforts and made enhanced liquidity provision a linchpin of its approach for dealing with the crisis.

10. As the flow of credit from depository institutions to the periphery of the financial system stopped, several central banks also allowed non-bank financial institutions to access their discount facilities. To get around the stigma associated with discount window borrowing, the Fed introduced an anonymous auction facility—the TAF (Term Auction Facility). To increase the supply of high quality collateral like U.S. treasuries and UK gilts available to financial institutions by swapping them for high quality, but less liquid collateral, the Fed introduced the Term Securities Lending Facility (TSLF) and the BoE the Special Liquidity Scheme (SLS). Finally, to alleviate global shortage of dollar liquidity several central banks entered into reciprocal currency swap arrangements with the Fed, and some introduced dollar liquidity operations outside the United States. The ECB has also signed agreements with the central banks of several European countries to improve the provision of euro liquidity to their banking sectors.

11. In the initial phase of the crisis, even as monetary authorities sought to facilitate the functioning of short-term funding markets, their operations were sterilized via open-market operations, so that no net new base money was added to the financial system. This approach had implications for the composition, but not the size of central bank balance sheets and had a flavor of a large-scale lender-of-last-resort action.<sup>5</sup> However, after the collapse of Lehman Brothers, central banks accelerated policy rate reductions and began expanding their balance sheets to support credit more directly.

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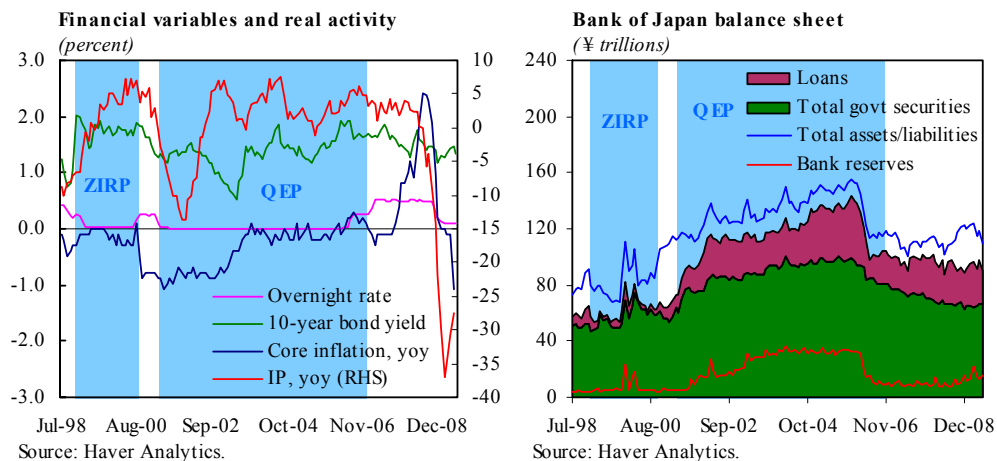
<sup>4</sup> Box 2 summarizes historical experience with unconventional monetary policy.

<sup>5</sup> Central banks were also involved in more direct rescue operations for several large banks and other financial institutions.

## Box 2. Past Experience with Unconventional Monetary Policy

Japan's experience in 1999–2006 provides the prime case study of unconventional measures. Following a bout of deflation, the Bank of Japan introduced in early 1999 the zero interest rate policy (ZIRP), committing to keep the interbank overnight rate at zero until “deflationary concerns are dispelled.” After a brief recovery of the economy, which pushed year-on-year change in core CPI above zero for just one month, the BoJ lifted ZIRP in August 2000.

However, the collapse of the dot-com bubble and slowdown of the world economy made another recession a possibility. As the overnight rate was still close to zero despite the exit from ZIRP, the BOJ had to take extraordinary measures. On March 19, 2001, it introduced quantitative easing policy (QEP) and simultaneously committed to keeping the policy rate at zero until “the core CPI registers stably a zero percent or an increase year on year.” The BOJ's quantitative easing set a target on bank reserves at the BOJ at around 5 trillion yen. In addition, the BOJ also announced that it would increase the amount of its outright purchases of long-term Japanese government bonds. The BOJ subsequently increased its target for reserves to 30–35 trillion yen before terminating QEP on March 9, 2006. In addition, the BoJ supported lending through special operations to facilitate corporate financing.



Analysts disagree whether the unconventional policies improved the performance of Japan's economy, as the counterfactual is difficult to establish. Most believe that the failure to deal resolutely with the undercapitalized banking system had doomed the monetary and fiscal efforts to reignite the economy.

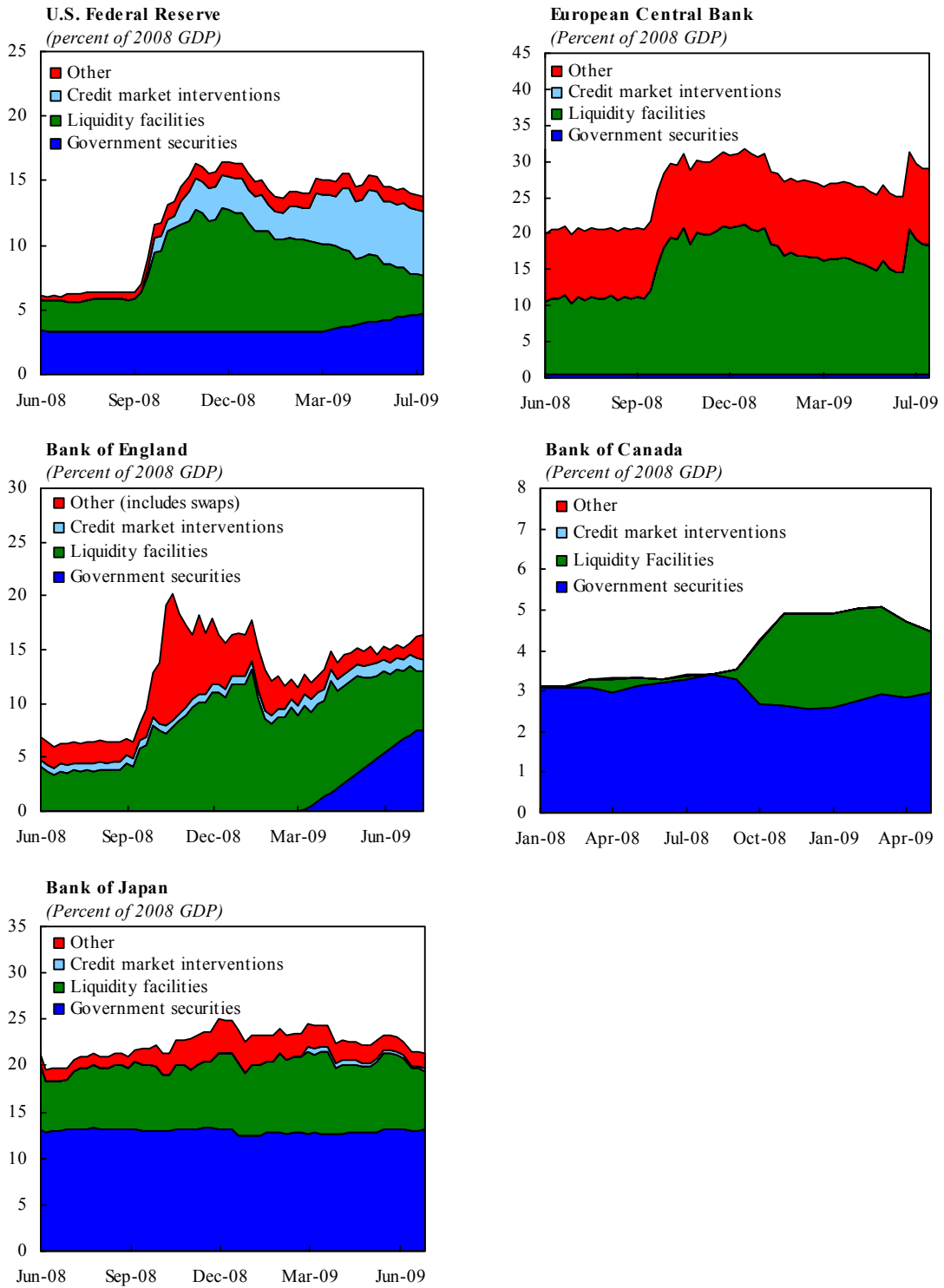
Evidence is more positive on the narrower issue of the ability of unconventional monetary policy to affect financial variables. For example, Okina and Shiratsuka (2004) show that the commitment to low rates under ZIRP affected policy rate expectations. Bernanke, Reinhart, and Sack (2004) suggest that QEP was effective in lowering the yield curve. The same authors provide evidence that the Fed's communication strategy in 2003, when its statements sought to reassure the markets that monetary accommodation would be maintained “for a considerable period,” were effective in guiding market expectations of policy rates.

Japan's experience is also relevant for exit. After QEP officially ended, the BoJ was able to reduce the size of its balance sheet and excess reserves fairly quickly, although not all the way to its late-1990s level. It curtailed sharply its funds-supplying operations and started gradually to reduce its holdings of government securities. It also began slowly to divest stocks acquired—on a fairly small scale—from commercial banks, but the process was interrupted by the current crisis. It should be noted, however, that the policy rate was raised only marginally—to 50 basis points—over the year that followed the termination of QEP.



12. One can observe considerable diversity in approaches taken to date among the G-7 central banks (Figure 2). The Fed has advanced far ahead on the path of credit easing, having employed a variety of unconventional measures on a large scale. It has been purchasing government bonds as well as the debt and mortgage-backed securities issued by the government-sponsored enterprises (GSEs) to bring down their yields and encourage investors to switch to riskier assets. These actions are aimed at reducing long-term funding costs, especially residential mortgage rates, and increasing bank reserves. The Fed has also set up facilities to support the commercial paper market by buying such paper directly from issuers or through money market mutual funds (Box 3). Finally, through the Term Asset-Backed Securities Lending Facility (TALF) the Fed has sought to enhance liquidity and jump-start the private-sector securitization market by providing funding and limiting the downside risk of investors in asset-backed securities. Through its diverse tools, the Fed not only has provided ample resources for banks to lend, but also in some cases bypassed them to give credit directly to lenders and investors, or facilitated credit flows by making funding contingent on lending. In addition, the Fed has stated that the policy rate is likely to stay exceptionally low “for an extended period.”

Figure 2. Decomposition of Central Bank Assets



Sources: Haver Analytics, Bank of England.

**Box 3. Fed's Facilities for Liquidity Provision to Key Credit Markets**

*The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF)* provides non-recourse loans to depository institutions and bank holding companies to finance purchases of high-quality ABCP from money market mutual funds. The banks face no credit risk and have zero risk weighting on these purchases. Effectively this facility indirectly guarantees a liquid market for high-rated ABCP holdings of MMMFs, thus encouraging them to remain invested in such paper. It was introduced after a failure of a major fund to maintain par value had triggered an outflow of cash from money market funds, disrupting in turn the commercial paper market, for which MMMFs are a major source of liquidity.

*The Commercial Paper Funding Facility (CPFF)* provides credit *directly* to issuers of unsecured and asset-backed commercial paper. The facility—which is a special-purpose vehicle funded by a loan from the Fed—purchases top-rated 3-month commercial paper. To reduce credit risk for the Fed, the Treasury has made a special deposit in support of CPFF. The facility eliminates rollover risks on terms that are not punitive, but less attractive than those prevalent in the private market before the crisis.

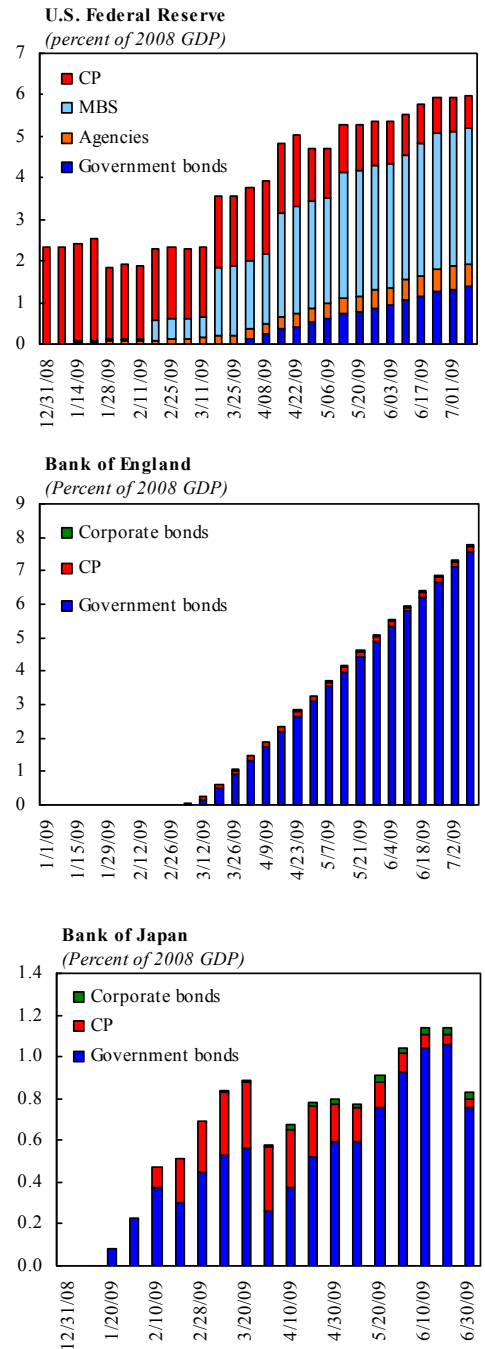
*The Money Market Investor Funding Facility (MMIFF)* was conceived as an additional crutch for the banks and MMMFs, as it would fund purchases of CDs and CP with maturities up to 90 days issued by highly-rated financial institutions. The program has a complicated structure, with the Fed setting up several SPVs that would pay a combination of cash (coming from the Fed) and SPV-issued ABCP in exchange for the instruments it purchases. The 10 percent first-loss ABCP slice provides a cushion for the Fed and limits the investors' exposure. So far this facility has been idle, as AMLF, CPFF, and FDIC guarantees appear to have provided adequate liquidity to the investors in and issuers of short-term bank liabilities. It is set to expire on October 30, 2009.

*The Term Asset-Backed Securities Loan Facility (TALF)*, operational since March 25, aims to restart securitization, which was a critical funding mechanism in the pre-crisis period. The flow of funds will go from the Fed through an ABS investor to a securitizer, and then to individual loans that are given to ultimate borrowers. Under the TALF, the Fed will issue non-recourse 3- and 5-year loans to a wide range of eligible ABS investors against triple-A ABS collateral backed by student, auto, credit card, small business, and commercial mortgage loans, with a possible future extension to private-label residential MBS. Overcollateralization—which determines the maximum loss the investor may suffer—ranges from 5 to 16 percent, depending on collateral and maturity. The interest rate on the loan is generally set at 100 basis points above 1-month LIBOR for floating rate loans (backed by floating rate ABS) or above the 3-year LIBOR swap rate for fixed rate loans. The Fed's balance sheet is protected by overcollateralization and the Treasury's 10 percent first-loss contribution coming from TARP funds. This program leverages TARP resources into a large facility (\$200 billion currently, and expandable to \$1 trillion) that relies on the private sector in credit allocation decisions while limiting associated credit risk.

13. The Bank of England rivals the Fed in the size of the balance sheet expansion, but its approach has been quite different. While it has put in place a program for purchasing private sector securities to alleviate stress in particular markets, efforts to stimulate the economy are based largely on money creation through government bond purchases (Figure 3). In particular, the BoE has been authorized by HM Treasury to purchase up to £150 billion of assets, including a maximum of £50 billion of private-sector assets, financed through the issuance of central bank reserves. On that authority, the BoE announced on March 5 a three-month Asset Purchase Program to purchase £75 billion worth of assets, mostly medium and long-term gilts. Subsequently it extended the term and scaled up the target to £125 billion. This amounts to 62 percent of outstanding gilts in the relevant maturity range or 57 percent of planned debt issuance in FY2009. The credit easing component of the Bank's unconventional policy—the £50 billion Asset Purchase Facility (APF)—authorizes the BoE to purchase a broad range of high-quality private assets, including commercial paper, corporate bonds, paper issued under the Credit Guarantee Scheme (CGS), syndicated loans and asset-backed securities created in viable securitization structures. However, at the moment facilities for only the first two asset classes have become operational, with net purchases totaling less than £2 billion worth of commercial paper and less than £1 billion worth of corporate bonds.<sup>6</sup>

14. The Bank of Japan's approach is similar to that of the Bank of England, in that it has undertaken some purchases of private assets, but focuses largely on money creation via purchases of government bonds. However, the scale of operations is much

**Figure 3. Outright holdings of securities by central banks 1/**



Sources: Haver Analytics, Bank of England, Bank of Japan.  
1/ Government and agency bonds - change since end-2008.

<sup>6</sup> In early June, the Bank of England published a consultative paper setting out a proposed extension of the APF to secured commercial paper.

smaller. The Bank of Japan has gradually scaled up the size of its outright purchases of government bonds from ¥1.2 trillion per month (the level set in October 2002) to ¥1.4 trillion in December 2008, and then to ¥1.8 trillion per month starting in March. At the latest rate, annual purchases would amount only to 2½ percent of the federal debt outstanding in early 2009—but close to 50 percent of the net bond issuance projected for 2009, providing an important source of financing for the government. On the other hand, even at that pace, BoJ's bond purchases are not much larger than amortization.

15. In addition to increasing bank reserves through government bond purchases in a manner reminiscent of its early 2000s' policy of quantitative easing, the BoJ has been purchasing private sector securities to alleviate stress in particular market segments. In particular, it has purchased high-grade commercial paper and corporate bonds with remaining maturity of less than a year. However, these operations are rather small, with BoJ commercial paper holdings barely exceeding one percent of its balance sheet (compared to nearly 18 percent at its peak for the Fed), and the limit on these holdings—¥3 trillion—is under 3 percent of the BoJ balance sheet size, and 16 percent of Japan's commercial paper market. BoJ's corporate bond holdings are currently negligible, and the limit is set at ¥1 trillion. In addition, in October 2008 the Bank suspended divestment of stocks it acquired to support the economy in the early 2000s. Then in February 2009 it started purchasing stocks from Japanese financial institutions to help reduce their exposure to market risk. This program is also limited to ¥1 trillion.

16. The European Central Bank has followed a strategy of “enhanced credit support.” It has boosted its liquidity facilities and expanded its balance sheet considerably, but has not engaged in outright purchases of government paper. Until recently, the ECB had resisted calls for supporting credit markets directly, but it greatly facilitated issuance of private securities by accepting them as collateral in repo operations. It has gone the furthest among major central banks in expanding the range of acceptable collateral and the term of its liquidity operations.<sup>7</sup> In late June, it auctioned off an unprecedented €442 billion of one-year funds at one percent. Finally, to support the housing market, the ECB has announced a €60 billion program to buy covered bonds over the course of next 12 months, with purchases starting in July.

17. The Bank of Canada is the only major central bank besides the Fed to have committed to maintaining low policy rates until there are clear signs of recovery. Moreover, in its latest statements it has made a “conditional commitment” to keep the interest rate at its effective low bound of 25 basis points until the end of the second quarter of 2009, pioneering such time-specific guidance. While expanding its liquidity operations, the Bank of Canada has taken very limited steps in the other areas, but it has put together a framework for

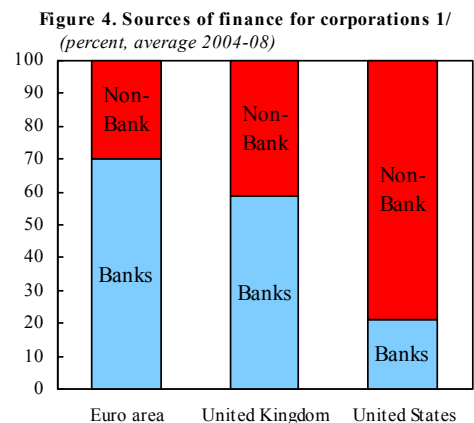
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<sup>7</sup> Even before the crisis the ECB accepted a broader range of collateral—including even commercial bank loans—than other major central banks.

quantitative and credit easing and has indicated that it is prepared to use such instruments if needed to provide additional stimulus to the economy.

18. What can account for the considerable difference in the extent to which G-7 central banks have relied on different unconventional approaches? Faced with an arguably unprecedented set of issues—a global financial crisis, near-simultaneous burst of several asset-price bubbles, breakdown of securitization, collapse of confidence, synchronized recession—central banks had to explore measures based on individual country circumstances and without much support from economic theory or prior experience, and understandably came up with somewhat different solutions. There also appears to be a conceptual disagreement on the usefulness of providing explicit guidance regarding the future path of interest rates. Largely, however, the difference in responses can be attributed to the differences—real or perceived—in the countries’ circumstances. Such circumstances include the depth of the recession, the relative roles played by banks and capital markets in credit allocation, the severity of the problems in the financial system, the flexibility of pre-existing institutional arrangements, and actions taken by the non-monetary authorities.

19. In particular, in the early stages of the crisis the ECB appeared to be relatively more optimistic about the outlook. Consequently, it had focused on liquidity support for struggling banks much more than on stimulating demand through rate cuts or quantitative easing. More importantly, the non-financial private sector in Europe relies much more on the banking system for credit than on securities markets (Figure 4), and the authorities’ efforts have appropriately focused on ensuring the banks are strong and have adequate resources to lend. Even in the United Kingdom, outstanding corporate bonds of domestic non-financial issuers total about £15 billion, with another £7 billion in commercial paper, so even the fairly small allocation for private assets under the APF amount to a non-negligible share of these markets.<sup>8</sup> Moreover, with a broad access to its lending window to begin with, there was less need for the ECB to introduce new facilities. At the same time, if the transmission mechanism through banks is impaired, credit easing is worth contemplating even in countries with traditionally large reliance on the banking system, as a way to go around the temporarily blocked traditional channel.



Source: ECB Monthly Bulletin, April 2009; Haver Analytics.  
1/ Breakdown of the sources of external financing of non-financial corporations.

<sup>8</sup> However, the market is much larger if financial issuers and foreign corporations issuing sterling debt are included.

20. Canada has emerged as one of the few countries whose financial system has not been damaged severely by the financial crisis, and the Bank of Canada until recently could afford to rely largely on conventional measures to support the economy in the face of external shocks. However, with economic prospects dimming and a global rise in risk aversion, Canadian banks have been tightening credit conditions, while the Bank of Canada has exhausted room for interest rate cuts. Consequently, the BoC is trying to guide interest rate expectations and contemplating quantitative and credit easing in the event the outlook deteriorates further. In a similar vein, while Japan's financial institutions were not highly exposed to U.S. toxic assets, their losses on stock holdings and expected rise in delinquencies has made them reluctant to lend, prompting the Bank of Japan to initiate some limited credit easing measures.

21. Finally, the actions of the legislative and executive branches of government shape the environment in which central banks and financial systems operate. G-7 governments have taken numerous actions to support financial institutions (Table 2). Guarantees of bank debt and deposits decreased bank reliance on the commercial paper market for funding. In certain countries the government has taken a leading role in providing liquidity to credit markets, reducing the need for central bank operations. For example, in Canada the government has been purchasing insured mortgage pools from financial institutions, and is working on setting up a facility to purchase term asset-backed securities, while the Development Bank of Japan has started outright purchases of commercial paper.

22. It should be noted that while all central banks pledge prudence in their credit easing operations, there is considerable differentiation in their exposure to credit risk. The Fed appears to have accumulated the riskiest portfolio among the major central banks, with the understanding, initially implicit, but now partly formalized in the setup of CPFF and TALF and in a joint Fed–Treasury statement, that ultimately the Fed's losses, if any, will be borne by the government. In the UK, the government authorized asset purchases by the Bank of England in a formal exchange of letters between the Governor and the Chancellor. The Bank is explicitly indemnified by the Treasury from any losses arising from these purchases. On the other hand, should the need to recapitalize the European Central Bank arise, apportioning contributions among national governments would present a delicate issue. The fear of triggering that discussion may be another reason why the ECB has not been more aggressive with purchases of risky assets. Moreover, different countries would benefit from such purchases to a different degree depending on the structure of their financial markets. Another aspect of being a multilateral institution is the difficulty the ECB would face in deciding on the country allocation should it decide to pursue the most traditional quantitative easing policy—purchasing government bonds.

#### IV. EFFECTIVENESS OF UNCONVENTIONAL POLICIES

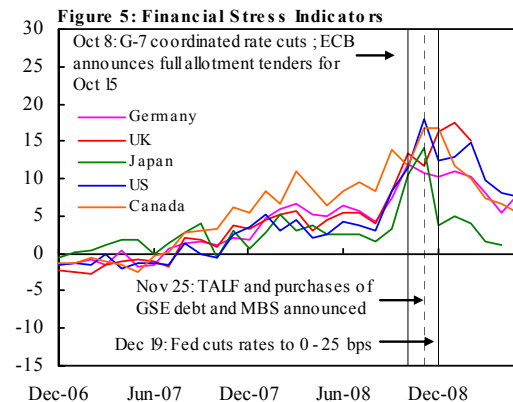
23. Taken collectively, policy actions, notably by major advanced country central banks, have contributed to the reduction in tail risks following the bankruptcy of Lehman Brothers and to the recent improvements in market confidence and risk appetite, as well as to the emerging signs of bottoming in the decline of activity in G-7 economies. However, financial indicators suggest that some policies are proving to be more successful than others and that central banks may need to take further actions if market condition regresses. Moreover, market developments highlight the limits to which central bank interventions can arrest the forces of global deleveraging and weakening aggregate demand, and signal that other public interventions are still needed to fully address remaining financial sector strains. As highlighted in the IMF's April 2009 Global Financial Stability Report (GFSR), "without a thorough cleansing of banks' balance sheets of impaired assets, accompanied by restructuring and, where needed, recapitalization, risks remain that banks' problems will continue to exert downward pressure on economic activity."

24. Gauging the effectiveness of central bank measures is difficult because transmission to the economy is complex and opaque. A number of factors influence market conditions, and the impact of individual policies is difficult to isolate, especially from the impact of fiscal and non-central bank financial policy actions taken over the same period. Moreover, it is difficult to determine what would have happened if the central banks had not taken action, especially given the relatively low level of market confidence that has prevailed since the crisis started. Finally, some of the enacted policies are relatively new, not completely implemented, or subject to mid-stream adjustments, and could, given time, prove more successful than they are currently perceived.

25. This analysis focuses on the observable effects of central bank interventions on credit conditions, especially on credit market interest rates, spreads, and volumes. It reviews the various transmission channels of policy: broad credit, bank lending, and interest rates, as well as the impact of policies on specifically targeted markets.

*Central banks have helped to reduce tail risks, but financial conditions remain tight and the bank lending channel strained*

26. Forceful monetary easing and unlimited offers of liquidity by major central banks have helped to reduce the extreme financial stress and tightness in financial conditions that prevailed following the bankruptcy of Lehman Brothers. Moreover, a few authorities, like the Federal Reserve and Swiss National Bank, directly participated in the rescue efforts for specific large, highly interconnected financial



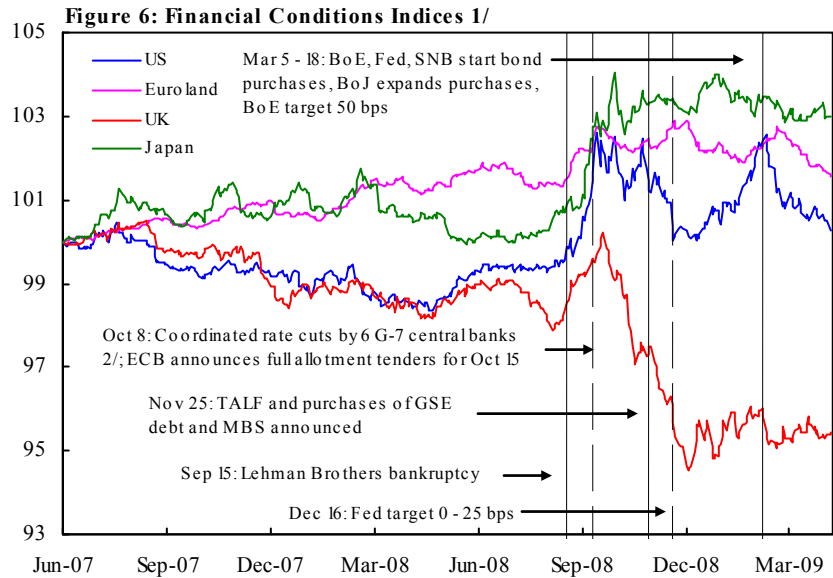
Source: IMF Staff. FSIs consist of 7 financial market variables, including the beta of banking stocks, the TED spread, the slope of the yield curve, corporate bond spreads, stock market returns, stock market volatility, and exchange rate volatility.



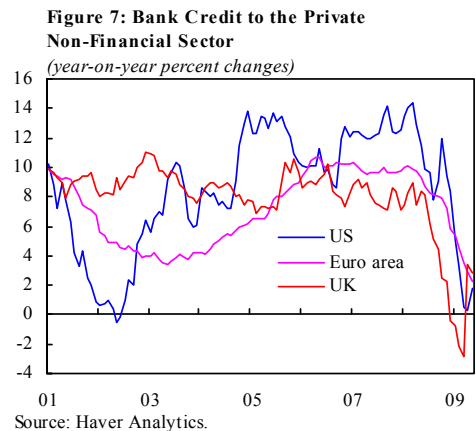
institutions<sup>9</sup>. As a result, the IMF's financial stress indices (FSIs, Figure 5)<sup>10</sup> for the major advanced economies have all dropped, with some falling below their pre-Lehman bankruptcy levels. Central bank efforts have helped to reduce the tail risks, including cascading insolvencies in the financial sector. Broad measures of financial conditions (Figure 6) have also

improved, partly due to the significant drop in real short-term rates. However, conditions remain tight relative to their pre-crisis levels, especially for some regions where higher real effective exchange rates and lower equity market capitalization (in Europe and Japan) have offset the decline in interest rates.

27. Despite the tremendous infusion of liquidity by central banks and the capital and guarantees provided by other agencies, the bank lending channel remains strained. Central banks have a more limited role in meeting the potential capital needs of banks and strengthening their capacity for new lending. Bank lending to the private non-financial sector has decelerated rapidly in the Euro area and the United States, and turned negative in the UK (Figure 7). The



1/ The indices combines real 3-month and long-term interest rates, the real exchange rate, and equity market capitalization to GDP.  
2/ Bank of Canada, Bank of England, ECB, Federal Reserve, Riksbank, SNB cut rates by 50 bps with strong support by Bank of Japan. The ECB recinded the rate cut and instead announced full allotment tenders at main refinancing rate.

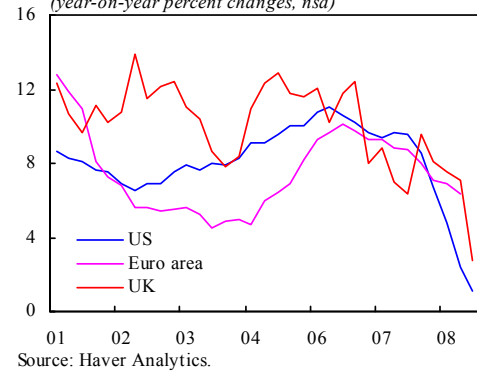


<sup>9</sup> The Bank of Japan also stands ready to purchase equity holdings and subordinated debt of major Japanese banks.

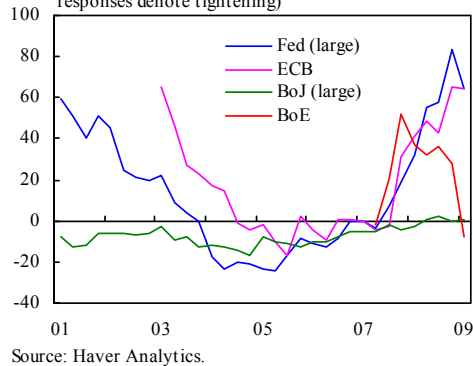
<sup>10</sup> The FSIs consist of 7 financial market variables, including the beta of banking stocks, the TED spread, the slope of the yield curve, corporate bond spreads, stock market returns, stock market volatility, and exchange rate volatility (Balakrishnan et al., 2009).

decline in total lending also looks dramatic (Figure 8).<sup>11</sup> Still, were it not for official interventions, credit flows would likely fallen much more—beyond comparison with any other post-war recession—given the magnitude of the shock. Surveys from the ECB and the Fed indicate that banks are still tightening lending standards to households and non-financial firms, albeit not as vigorously as at the peak of the crisis (Figures 9 and 10). In the UK, standards for corporate lending actually loosened slightly in the first half of 2009, while standards for households continued to tighten. This reluctance to lend has contributed toward a persistently elevated level of reserve balances of depository institutions with the central banks, which, for example, stood at nearly \$750 billion in mid-July in the United States. In contrast to these swings, lending standards in Japan have largely remained on the pre-crisis trajectory of moderating loosening, with standards for large corporations reaching the neutral point.

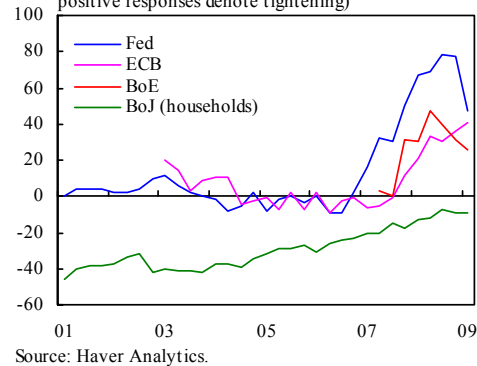
**Figure 8: Total Credit to the Private Non-Financial Sector**  
(year-on-year percent changes, nsa)



**Figure 9: Bank Lending Surveys: Corporate Loans** (net survey balances; in percent; positive responses denote tightening)



**Figure 10: Bank Lending Surveys: Residential Real Estate** (net survey balances; in percent; positive responses denote tightening)

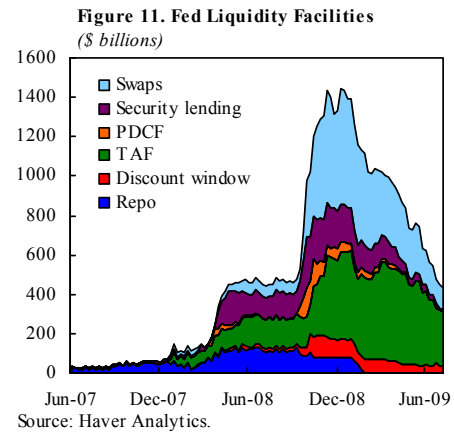


### *Funding strains are easing, but the money market complex is contracting*

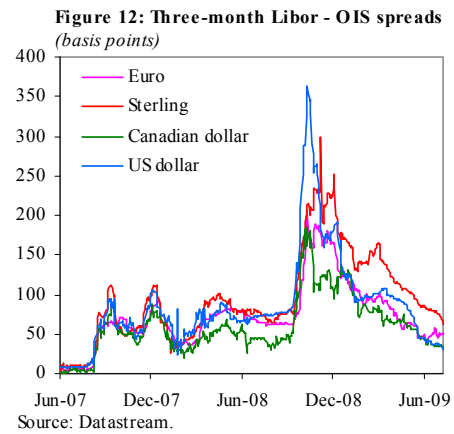
28. Central banks have eventually been successful in reducing money market strains. Funding markets are where monetary policy and liquidity operations tend to have their initial contact with the financial system, and where central banks focused both individual and coordinated efforts for a longer period of time during this crisis. Collectively and over time central bank measures have contributed to the steep reductions in Libor, repurchase (repo), and commercial paper rates and their risk premiums, as well as a narrowing in foreign

<sup>11</sup> While the credit growth rates at the end of the sample are lower in Figure 7 than in Figure 8, this likely reflects timing differences, with bank credit data available monthly through June 2009, while total credit numbers are quarterly and go through 2009Q1 for the U.S. and the UK and only through 2008Q4 for the euro area.

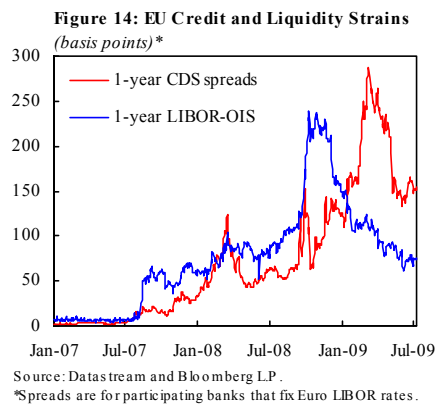
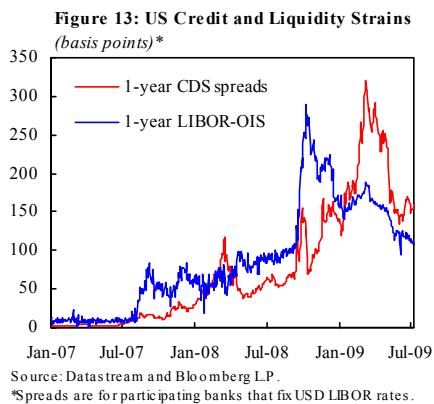
exchange swap basis. Reflecting this reduction in liquidity risk, usage of central bank liquidity facilities has generally been falling lately (Figures 4 and 11).



- Libor rates on maturities of 3 months or more have dropped across a number of currencies, and so have their spreads over implied overnight rates derived from overnight index swaps (OIS) (Figure 12). This not only means lower bank funding costs, but a decline in key indices used in setting the interest rates on a host of loans to non-financial actors, and fixed income and derivative products. However, Libor-OIS spreads still remain wider than their pre-crisis levels, partly reflecting the limits of central bank liquidity operations. The operations appear to have reduced liquidity risk premiums but have had less of an impact on counterparty credit risk premiums as reflected in a greater decline in LIBOR–OIS spreads than in bank CDS spreads (Figures 13 and 14).<sup>12</sup>

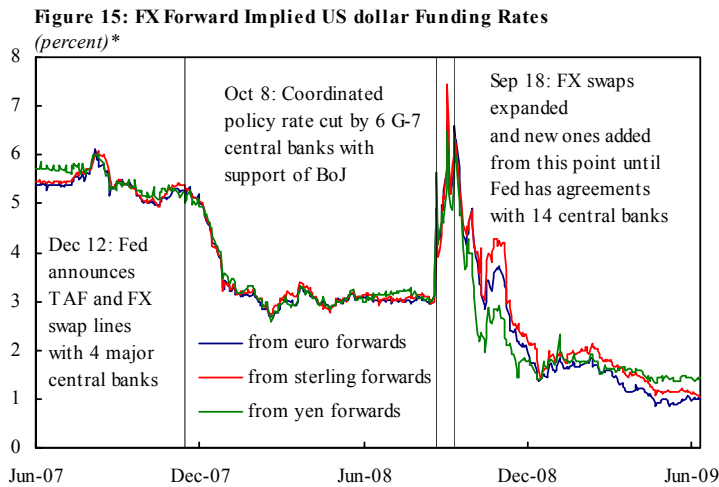


Credit risk premiums remain high as markets still perceive banks to face considerable risks from unresolved troubled asset issues and headwinds from rising unemployment. Moreover, higher premiums may also reflect a long-lasting increase in the price of credit risk embedded in uncollateralized money market rates.



<sup>12</sup> The Libor-OIS spreads can be decomposed to estimate what can be attributed to counterparty credit risk, and other risks, including liquidity risk.

- The Term Auction Facility<sup>13</sup> and currency swap arrangements between the Federal Reserve and 14 central banks have helped to enhance the functioning of the foreign exchange swap and forward markets. These markets had become dislocated as financial institutions, especially those without access to Federal Reserve liquidity, attempted to garner their short-term dollar funding from other sources. At the height of the crisis, dollar funding rates implied by 3-month euro and sterling forward contracts were 6.61 percent and 7.44 percent, respectively. By mid-summer 2009, these rates had fallen to around 1 percent (Figure 15).

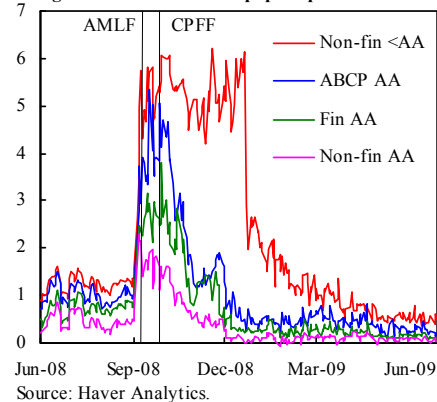


Source: IMF staff calculations and Bloomberg L.P.

\* 3-month US dollar funding implied by FX forward and libor rates.

- Commercial paper rates are falling in advanced economies, driven in part by direct purchases and liquidity operations by the Fed, Bank of England, and Bank of Japan targeted at short-term corporate financing. Both the highest and the lower tiers of CP rates are falling,<sup>14</sup> although there is still a wide positive spread between the higher and the lower tiers (Figure 16). In the United States, the amount of CP outstanding is still contracting, notwithstanding temporary increases following the announcements of the Asset-Backed Commercial Paper Money Market

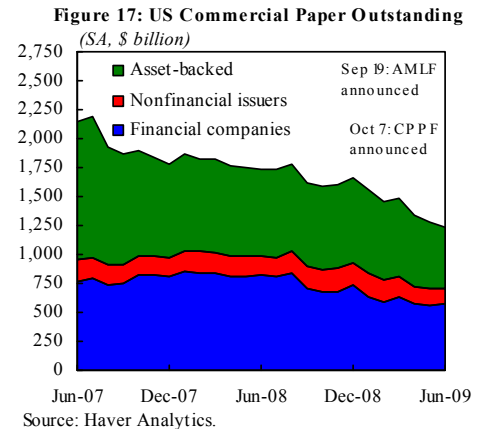
**Figure 16. Commercial paper spreads over T-bill**



<sup>13</sup> A few studies have empirically tested the effectiveness of the TAF in reducing the dollar Libor-OIS spread. An early study by Taylor and Williams (2009) concluded that it was not effective, but subsequent studies by Sack and Meyer (2008) and another by McAndrews, Sarkar, and Wang (2008) refutes that conclusion. A fourth study by Hooper and Slok (2009) concluded that the announcement effect of the TAF was most important, and that the TSLF was not significant in narrowing the Libor-OIS spread.

<sup>14</sup> In the United States, second tier CP volumes have fallen substantially, so the decline in rates may partly reflect a survivorship bias, although the drop in broad liquidity concerns is likely a more important factor.

Mutual Fund Liquidity Facility (AMLF) and the Commercial Paper Funding Facility (CPFF) (Figure 17). This largely reflects a fall in demand for CP funding since banks are attempting to delever, reducing their balance sheet financing needs, and also have alternative funding sources via both government guaranteed debt and to a lesser extent non-guaranteed note issuance. At the same time, it should be noted that the Fed's facilities buttressed the CP market at the crucial time, allowing a reduction in rate and extension of maturities and supporting the volume.



- Term repurchase (repo) rates have declined in G-7 countries as central banks reduced policy rates and introduced operations that aided the functioning of the repo markets, such as the BoE's Special Liquidity Scheme and the Fed's Term Securities Lending Facility. These and other central banks, particularly the ECB, freed up some of the high quality collateral that financial institutions could use as collateral by accepting a wide range of assets to pledge at central bank auctions. There had been a scarcity of high quality collateral as demand for safe haven assets rose and counterparties no longer accepted non-traditional collateral for repos during the highly volatile periods of the crisis. Despite lower repo rates, repo volumes have fallen over the crisis as the number of dealers has declined, and the activity of securities lenders and some other money market investors has been curtailed.

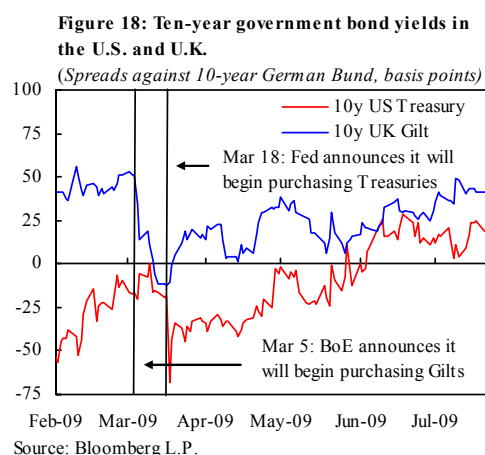
29. Despite the reduction in money market rates and risk premiums, the progress on money market volumes is mixed, with some segments still experiencing significant drops in outstanding amounts. The shock to the money market complex during the crisis has led to a potentially permanent repricing of credit risk in money market rates, the exit and significant reduction in the activity of a number of money market players, and a likely tightening of regulations governing bank liquidity management and money market mutual fund investments. In addition, ongoing deleveraging efforts by financial firms are likely to lead to a reduced demand for funding, and the very low levels of money market rates are leading to early signs of reduced demand for money market investments. All of these factors have led to broad-based shrinkage in money market activity and capacity, some of which is likely to persist for a long period of time.

*Central banks efforts to reduce longer-term rates have had more mixed results*

30. Central bank operations directed at longer-term fixed income markets, including those supporting securitization markets, have had mixed results with some programs more successful at lowering rates or significantly affecting origination compared to others. Yields on government bonds have increased over the last several months despite sizeable purchases

by several major central banks. The spreads between private asset yields and treasuries have declined both in the markets with major central bank support, such as U.S. conforming mortgage market, and in those with much more limited support, such as corporate bonds. This suggests that the compression in a wide variety of credit spreads since the first quarter may be partially attributed to the broad-based fall in investor risk aversion, rather than to any particular policy interventions—although it may well be the totality of the interventions that has created a more favorable climate.

- The Fed is finding it challenging to keep nominal intermediate-dated U.S. Treasury yields in check, notwithstanding an initial decline in yields following the announcement of their purchases. Improving views about the global economic outlook, reduced concerns about deflation, and some anxiety about increased government supply to finance anti-crisis efforts are counteracting the yield impact of quantitative easing by the Fed, BoE, and BoJ. As a result, despite a noticeable drop in yields on U.S. and UK government bonds immediately following the announcement of large bond purchase programs by the respective central banks (Figure 18), most global yield curves have steepened afterwards. In particular, between the announcement date on March 18 and June 30, 2009, 5- and 10-year Treasury yields rose about 60 bps. In contrast, JGB and UK gilt yields moved by much less, although 5-year gilts increased 38 bps since March 4, 2009 due primarily to the BoE's announcement that it will suspend its purchases of 5- and 12-year bonds in late June. In Germany and Canada, whose central banks have not engaged in purchases of government bonds, intermediate yields rose about 25 and 30 bps respectively between early March and late June of 2009.
- Interestingly, augmented liquidity provision may have an impact on government bond yields. Čihák, Harjes and Stavrev (2009) estimate a yield curve model for the euro area and find that in the recent period the actual yield curve has been lower than predicted. They attribute that deviation to the enhanced credit support provided by the European Central Bank, although other explanations cannot be ruled out.

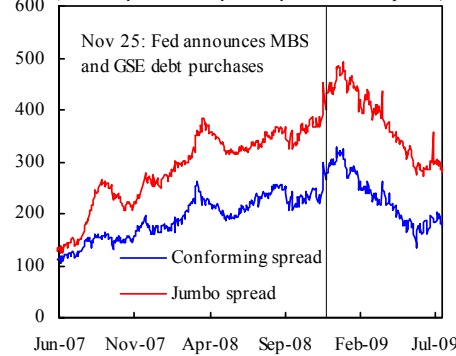


- The Fed's purchases of the MBS and direct obligation of the GSEs helped to reduce mortgage rates and compress their spreads over U.S. Treasuries between November 25, 2008 and late April 2009 (Figure 19). However, since then these yields have started to rise again as Treasury yields have increased. On net, both 30-year agency conforming mortgage rates and those on non-conforming jumbo loans remain below the levels observed before the Fed announced its purchase program, but

conforming yields have declined more (Figure 20). Additionally, there was a large jump in refinancing as conforming mortgage rates fell below 5.0 percent, but this activity has slowed now that the rates have increased again. Moreover, since November 2008 there has been very little private buying interest, leaving the Fed and US Treasury to pick up almost the entire amount of the new issuance of agency MBS (Figure 21).

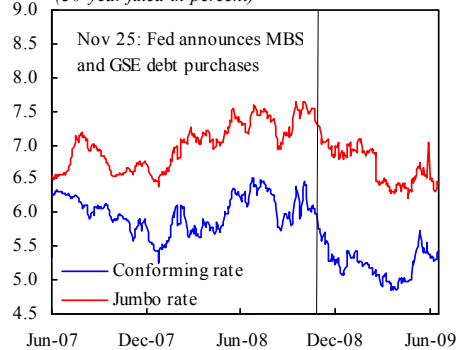
- The corporate bond purchases by the BoE and BoJ have been small relative to the size of their balance sheets and the size of the overall markets. The BoE primarily uses its program as a backstop to potential dislocations in the UK corporate bond market. Despite the small amounts purchased, the BoE's program has contributed to the narrowing of UK corporate bond spreads on the margin. The main reason for tightening corporate credit spreads is the strong investor interest in corporate bonds globally. Given these improvements in bond market conditions, the BoE's purchases have begun to slow, and market participants suggest that the corporate bond portion of the asset purchase program may no longer be necessary, although greater support for other private credit market may still be warranted. The Bank of Japan focuses its purchases on bonds with up to one year in maturity. It is part of the BoJ's efforts to enhance corporate funding conditions, and not geared toward lowering longer-term corporate bond yields or credit premiums.

**Figure 19. US Mortgage Spreads**  
(over 10-year treasury bond yield, in basis points)



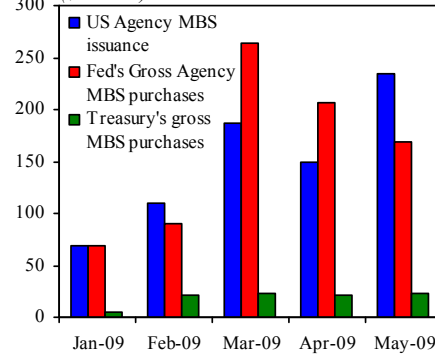
Source: Bloomberg L.P.

**Figure 20: US Mortgage Rates**  
(30-year fixed in percent)



Source: Bloomberg L.P.

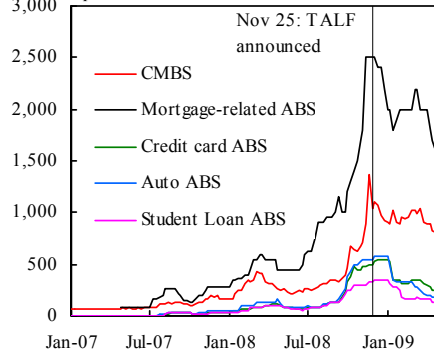
**Figure 21. US Agency New MBS Issuance and Gross Federal Reserve MBS**  
(\$ billions)





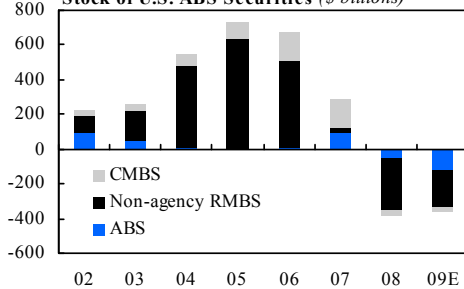
- Kick-starting securitization markets through the Fed's TALF is proving to be challenging. However, spreads on highly-rated consumer asset-backed securities (ABS) and commercial MBS (CMBS), and to a lesser extent mortgage-related ABS, have narrowed following the announcement of the TALF and the eligibility of CMBS for TALF funding (Figure 22). New issuance of consumer ABS started slowly after the initial TALF auctions, but has begun to pick up (Figure 23). CMBS issuance, however, remains virtually non-existent (Figure 24). The capacity of traditional buyers of consumer ABS and CMBS has diminished over the crisis, and the Fed is enticing remaining players into this space with very high expected returns on their capital.

**Figure 22: AAA-rated U.S. Asset-backed Securities Spread to Libor**



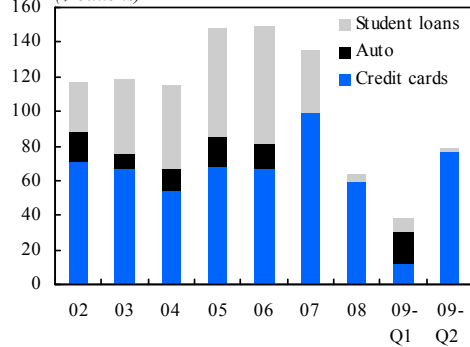
Source: ??

**Figure 23: Annual Change in Outstanding Stock of U.S. ABS Securities (\$ billions)**



Source: Thomson Financial, Bloomberg, SIFMA, Loan Performance, Trepp, J.P. Morgan.  
 Note: ABS includes autos, student loans, and credit cards. CMBS reflects conduit issuance. RMBS includes subprime, Alt-A, and prime.

**Figure 24: Gross Issuance of US Consumer ABS (\$ billions)**

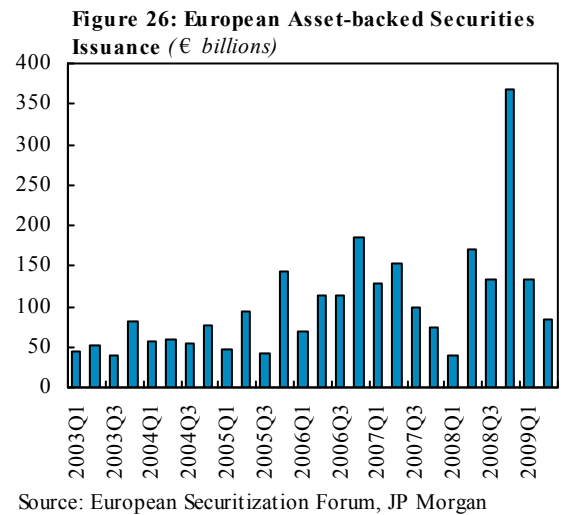
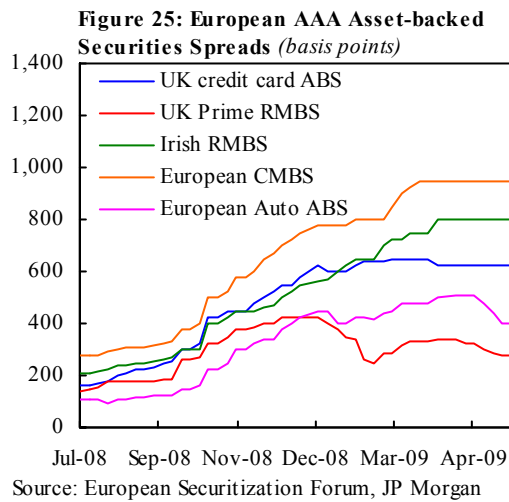


Source: SIFMA  
 Note: 2009 quarterly numbers are given at an annual rate.

- Securitization markets also remain under pressure in Europe, despite the wider collateral accepted and longer terms offered by the ECB's and BoE's liquidity operations. The UK's official program to guarantee new issuance of securitized products is run by the Treasury. Secondary market spreads in UK and European ABS and RMBS markets remain wide and have not improved significantly even during the latest decline in broader credit spreads. Concerns about credit deterioration in the underlying collateral continues to put upward pressure on spreads (Figure 25). However, despite wide spreads, primary issuance volumes did not materially decline in 2008 and 2009, reflecting the significant amount of new issues retained by the issuer as collateral for central bank funding (Figure 26). For all of 2008, market participants estimate that 98 percent of new issues were



retained by issuers.



- The ECB's announced plan to purchase €60 bn of European covered bonds has already led to some early signs of improvement in that market. Credit spreads have started to narrow since the ECB's announcement in early May and issuance volumes have risen. The actual purchases by the ECB began in early July.

## V. EXIT STRATEGY

*At the current juncture in the global economic cycle, monetary policy in the large advanced economies is justifiably accommodative, notably since there are no clear signs as yet of a durable recovery and core inflation continues to soften. However, when financial conditions normalize and activity gains greater momentum, monetary stimulus will need to be withdrawn consistent with maintaining the economy at potential and avoiding inflation.*

31. **Developing clear and effective exit strategies from exceptional monetary policy actions, involving both an unwinding of unconventional measures and a return to overnight interest-rate management as the principal tool of monetary policy, will be central to ensuring a smooth return to normal market functioning.** The large expansion of central bank balance sheets is mirrored in the growth of bank reserves, underpinning concerns that the excess liquidity could transform into rapid credit growth and lead to inflation. Such concerns are not justified at this stage of the economic cycle, notably because of large and rising output gaps coupled with a shortage of bank capital and a tightening of bank lending standards. However, it is imperative that central banks develop plans that achieve timely and smooth exits from exceptional policy actions to ensure a smooth return to private credit intermediation and to forestall inflation. But care is required to avoid a premature withdrawal of support that could set back the healing process and the incipient recovery. Moreover, to limit concerns about inflation and the risk that liquidity is

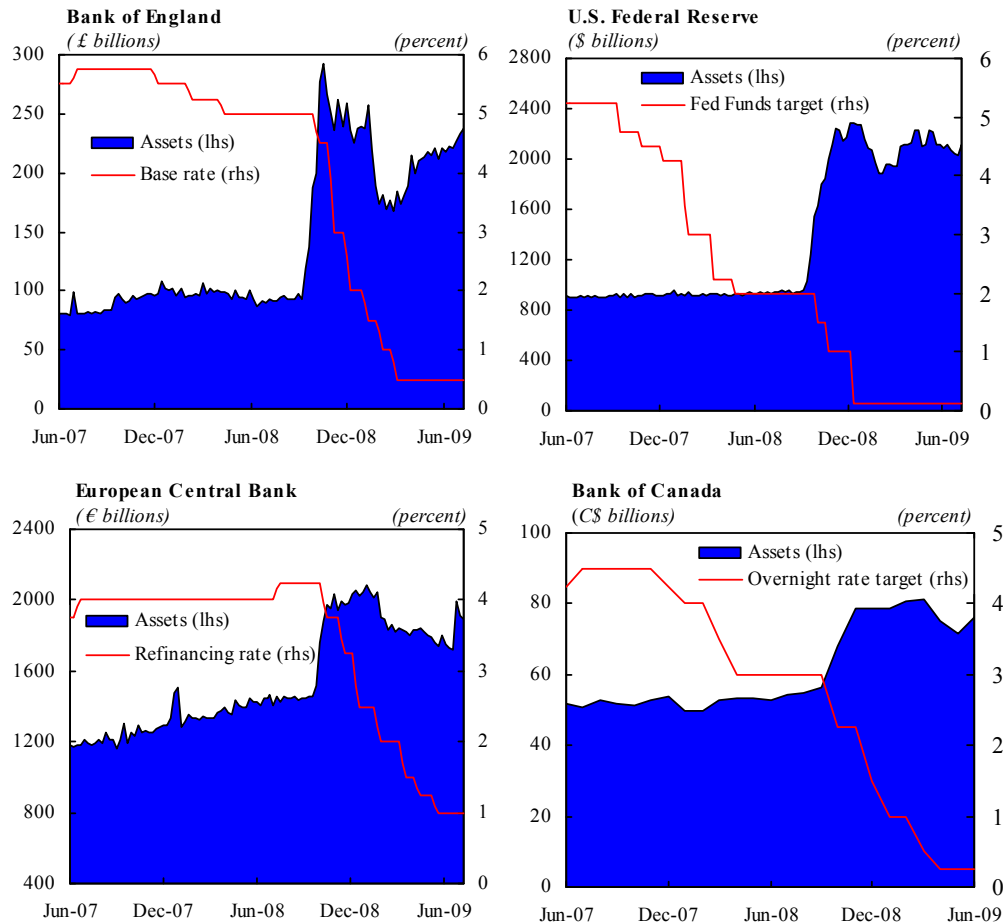
prematurely withdrawn while the recovery is still fragile, monetary authorities will need to communicate clearly the objectives and the tools of their unconventional policies, as well as their exit strategies.

**32. In considering the exit from exceptional monetary policy actions, several conceptual issues come to the fore.** First, does the size of central bank balance sheets prior to the crisis provide a guide for their appropriate size as exit is achieved, and, if so, how fast can balance sheets contract without undermining the balance between sustaining economic recovery and limiting inflation pressures? Second, can central banks control policy rates even though their balance sheets remain significantly larger than they were prior to the crisis? Third, are there certain central bank actions undertaken during the crisis that will unwind automatically as financial conditions improve? Fourth, beyond self-unwinding operations, can monetary policy be tightened through operations on the liability side rather than a contraction of their bank balance sheets? Fifth, if central bank balance sheets need to contract, how best to prioritize asset sales without undermining economic recovery?

**33. There may be merit in central banks holding some assets to maturity, even if it implies expanded balance sheets for an extended period of time.** Exceptional policy actions by central banks in the context of the crisis has led to a rapid acquisition of assets, mirrored by an expansion of reserves on the liability side of their balance sheets. While the recourse to unconventional measures has exposed central banks to greater credit risk, to the extent that these policy measures were aimed at alleviating strains in individual credit markets, central banks may choose to sustain their operations, even though they are acting more broadly to tighten monetary conditions. Moreover, while some unconventional measures will unwind naturally as market conditions normalize, others that are centered on purchases of assets that are longer-term in nature and less liquid could be difficult to wind. If these assets are sold before the relevant markets recover, central banks may incur significant financial losses that could jeopardize economic recovery. The problem is likely to be much greater for some assets, such as mortgage-backed securities and agency bonds, where central banks, notably the Fed, have come to dominate the market, than other assets, notably treasuries, where the market is deep and central bank purchases are comparatively small, except in the UK.

**34. As and when the balance of risk shifts toward greater concerns regarding inflation, central banks can shift towards a tightening of the monetary policy stance through liability management, notwithstanding expanded bank balance sheets and large reserves in the banking system.** A byproduct of aggressive credit and quantitative easing by central banks is the rapid buildup of aggregate reserves in the banking system, leading to a sharp decline in overnight rates that is consistent with broad macroeconomic objectives in the current context. If, however, inflation concerns mount, central banks could begin to raise policy rate even if their balance sheets are substantially above pre-crisis levels. Above-zero policy rates may well co-exist with expanded balance sheets on the way up, as they did on the way down (Figure 27).

Figure 27. Central Bank balance sheets and policy rates



Source: Haver Analytics.

35. **However, managing the excess reserves to allow central banks control policy rates will be critical to formalizing exit strategies from the unconventional measures.** While there may be room to unwind the stock of treasuries on central bank balance sheets—given the depth of the treasuries market and the relatively small size of central bank purchases—to mop up excess reserves prior to raising policy rates, unwinding of unconventional measures aimed at easing specific credit markets will need to be timed with the repair of these markets. Beyond the sale of treasuries to soak up liquidity, central banks could raise interest paid on reserves to discourage banks from lending their excess reserves to each other in the overnight market and push the overnight rate below the target. The Fed’s recently acquired ability to pay interest rate on bank reserves or instruments such as the

ECB's deposit facility ensure central bank's ability to keep the interbank overnight lending rate in a tight range.<sup>15</sup>

36. **With regard to the unwinding of unconventional measures, short-term credit operations—where the scale of intervention is determined by private demand—have already started to unwind naturally as market conditions normalize.** Financial conditions have improved, making central bank programs increasingly unattractive, notably since lending facilities provide liquidity at a premium over the main policy rate or with a high haircut applied to the required collateral. This has made interbank lending the more attractive option, and banks have reduced their recourse to liquidity provision from the central banks, although the outstanding levels under various old and new facilities are still considerably higher than before the crisis. Central bank liquidity swaps have shrunk as dollar funding in non-U.S. markets has improved. Similarly, recourse to the discount window has declined, while some of the Fed's emergency facilities, including the PDCF and the TSLF, have not been accessed in recent months and the amount outstanding under the TAF has declined.<sup>16</sup> One exception is the euro area, where in late-June banks took the opportunity to lock in one-year credit offered by the ECB at the rate of one percent. However, this spike is likely to be temporary, and banks are not expected to roll over fully the maturing loans under shorter-term facilities.

37. **The unwinding of medium- and long-term asset purchases may, however, be a slower process.** Selling these securities once conditions normalize seems to be a logical counterpart to buying them when conditions were stressed. On the other hand, given the large size of many credit-easing programs involving the purchases of long-term assets, including corporate bonds and agency securities, it will be difficult to sell assets without a significant market impact. For instance, in the mortgage-backed securities market, even small sales of securities by the central bank could cause spreads to widen considerably and to undermine recovery in the housing market. Central banks could also hold these assets to maturity, which would help avoid capital losses and not jeopardize economic recovery.

38. **In addition to mopping up liquidity through a contraction of central bank balance sheets, monetary policy could also be tightened through substitution on the liability side.** In particular, central banks could raise reserve requirements, issue central bank bills or conduct reverse repos to reduce excess reserves, albeit subject to some constraints. Central banks could mandate banks to hold greater statutory reserves to mop up some of the liquidity, although it is likely that the requirement would have to be raised quite dramatically

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<sup>15</sup> Given that not all financial institutions can have deposits at the Fed, and of those that can, not all are remunerated (the GSEs being the most notable example), limits to arbitrage due to counterparty risk may prevent the deposit rate from being a hard floor on the overnight rate. Establishing more uniform rules might help the Fed to improve control over the overnight rate.

<sup>16</sup> The size of TAF and TSLF auctions has been reduced recently in response to flagging demand.

to make a serious dent. Alternately, fiscal authorities could issue financial obligations, drawing liquidity from the banking system, and deposit proceeds at the central bank. However, the willingness of the Treasury to cooperate in such a program cannot be taken for granted, owing to political economy considerations, notably since such action would be seen as increasing gross government debt. Political consensus would also be required to allow central banks to issue their own bills. Also, while such bills would absorb reserves from the banks, they would instead put in their hands an asset that could easily be used as collateral to draw more liquidity, including from the central bank. Reverse repos are standard central bank operations used to absorb liquidity, but conducting them on a massive scale may run into technical constraints—such as limited balance sheet capacity of primary dealers.

## VI. CONCLUSIONS

39. A combination of a major deflationary shock and financial market distress has prompted G-7 central banks to cut policy rates to near zero and engage in unconventional monetary policy. Such measures included commitment to keeping interest rates low for an extended period of time, dramatic expansion of liquidity provision, purchases of long-term government bonds, and direct intervention in key credit markets.

40. The scale and scope of unconventional measures have differed substantially across major central banks. Most of them boosted significantly their liquidity operations, with the ECB being at the forefront in terms of the size, maturity, and collateral and counterparty eligibility. Massive asset purchases have boosted the size of the central balance sheet the most in the United States and the United Kingdom. However, the Bank of England has primarily relied on the purchases of government bonds, while the Fed has acquired a variety of assets, including commercial paper and mortgage-backed securities and providing financing for acquisition of other asset-backed securities. The reasons for this diversity include differences in institutional arrangements, in the role of the banking system, in the degree of distress in financial markets, and in the assessment of economic prospects.

41. Central bank interventions, along with government actions, have been broadly successful in stabilizing financial conditions over time. While stress indicators remain at elevated levels, tail risks have declined dramatically and funding strains are easing. Ample liquidity provision helped avoid a meltdown in the financial system. Direct support of credit flow to borrowers and investors in disrupted markets and indirect support through broadening collateral eligibility requirements appear to have been successful in alleviating pressure and propping demand. On the other hand, purchases of government bonds seem to have had only temporary impact on treasury yields.

42. While major industrial economies will need extraordinary support for some time, it is not too early to think about exit strategies. Unwinding unconventional measures will not be an easy task, and it requires a sensible plan, skillful execution, and clear communication. Many of the short-term facilities can be allowed—and have already started—to run their

course when market conditions normalize, but unwinding the holdings of long-term securities may disrupt the markets. Institutional frameworks may need to be adjusted to help central banks re-absorb liquidity when recovery gets underway.

**Table 1. Unconventional Measures Undertaken by G-7 Central Banks**

	<b>Fed</b>	<b>BoJ</b>	<b>ECB</b>	<b>BoE</b>	<b>BoC</b>
Commitment to keep policy rate low	<b>Yes</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>Yes</b>
Enhanced provision of liquidity to financial institutions	<b>Yes</b> TAF, PDCF, TSLF	<b>Yes</b> Broadened collateral; increased JGB purchases; introduced special funds-supplying operations	<b>Yes</b> Enhanced provision of long-term refi, broadened collateral	<b>Yes</b> Extended DW and OMO maturities; broadened collateral; introduced Special Liquidity Scheme	<b>Yes</b> Enhanced term PRA, introduced Term Loan Facility, broadened collateral
Provision of liquidity to credit markets	<b>Yes</b> CPFF, AMLF, MMIFF, MBS purchase program, TALF	<b>Yes</b> Outright purchases of commercial paper and corporate bonds (with remaining maturity under one year)	<b>Yes</b> Purchases of covered bonds	<b>Yes</b> Asset Purchase Facility (commercial paper and corporate bonds)	<b>Yes</b> Term PRA Facility for Private Sector Instruments
Purchase of long-term securities	<b>Yes</b> Treasuries and agency bonds	<b>Yes</b> Government bonds	<b>No</b>	<b>Yes</b> Gilts	<b>No</b>

**Table 2. Key Government Initiatives to Stabilize the Financial System**

	<b>United States</b>	<b>Euro area</b>	<b>Japan</b>	<b>United Kingdom</b>	<b>Canada</b>
<b>Deposit Insurance</b>	Increased insurance limit on individual accounts and introduced unlimited guarantee for non-interest-bearing business accounts	Increased the minimum deposit guarantee with permission to member states to offer higher guarantees		Increased coverage for retail deposits	Some provinces strengthened insurance of credit union deposits
<b>Guarantees of bank liabilities</b>	Temporary Liquidity Guarantee Program guarantees new senior debt of commercial banks, thrifts, and their holding companies	Numerous European countries announced bank debt guarantees, with fees varying across countries		Introduced a Guarantee Scheme for certificates of deposit, commercial paper, and senior unsecured bonds and notes for any U.K. incorporated bank or building society  Introduced a guarantee program for new issuance of AAA-rated ABS	Introduced schemes for guaranteeing new senior wholesale borrowing by certain deposit-taking institutions and insurance companies
<b>Guarantees of bank assets</b>	Provided partial guarantees on the value of ring-fenced assets of Citigroup, Bank of America, and AIG  Extended guarantee to money market mutual funds		Expanded public credit guarantees on banks' lending to SMEs	Under the Asset Protection Scheme the government guarantees portfolios of problematic assets on banks' balance sheets against large future losses  Under the Working Capital and Enterprise Finance Guarantee Schemes the government provides partial guarantees on new bank lending to firms	
<b>Loans to financial institutions</b>	Extended credit lines to troubled financial institutions, such as AIG and (yet untapped) government-sponsored enterprises (GSEs)				
<b>Capital injection</b>	Funds from various programs within TARP have been used to acquire non-voting, preferred shares in financial institutions  Government acquires preferred shares in housing GSEs to keep their net worth positive.	Many countries injected capital into financial institutions	Increased the size of funds set aside for capital injection	All U.K. banks and building societies are eligible for a recapitalization scheme to provide Tier 1 capital in the form of equity and preference shares at institution's request	Introduced authority for Minister of Finance to inject capital into troubled financial institutions
<b>Asset purchases</b>	Treasury purchases mortgage-backed securities  Public Private Investment Program	Spain created a fund to buy high-quality bank assets on a voluntary basis, at market prices	The government has submitted legislation to set up a separate corporation to purchase shares held by banks	The Special Liquidity Scheme allowed banks to swap temporarily illiquid assets of sufficiently high quality for gilts	The federal government purchases, via auctions, insured mortgage pools through the Canada Mortgage and Housing Corporation  Canadian Secured Credit Facility was introduced to purchase securities backed by loans and leases on vehicles and equipment



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