

## **Crisis and Implications for Central Bank Balance Sheets: Policies, Effectiveness and Designing an Exit**

*Krishna Srinivasan<sup>1</sup>*

**Preliminary Draft – Not to be Quoted**

### **I. INTRODUCTION**

1. In response to the financial crisis and the associated slump in the global economy—termed by some as the Great Recession—policymakers across major advanced and key emerging economies adopted large-scale and wide-ranging measures, which have yielded tangible benefits. These policy actions have included significant fiscal stimulus—amounting to around 2 percent of GDP in the G20 countries—extraordinary credit and quantitative easing by major central banks, and large-scale public sector support for the financial sector. These policy actions have contributed to stabilizing financial market conditions and global economic activity.

2. As the global economy begins to recover, policymakers will need to bridge from extraordinary short-term support to medium-term policy requirements through credible and coherent exit strategies. The key challenge is to map a course between exiting from public interventions too early, which would jeopardize progress in securing financial stability and economic recovery, and exiting too late, which would distort private incentives and create new risks. With recovery in most advanced economies expected to be weak, and no signs as yet of a sustained pick-up in private demand, policy stimulus will need to be maintained in these economies at least through 2010. On the other hand, however, some major emerging economies are already growing rapidly, and may have to unwind stimulus faster than the advanced economies.

3. Against this backdrop, this paper focuses on key central bank policy actions aimed at alleviating the financial crisis and bolstering aggregate demand. It assesses their effectiveness, and examines issues relating to the timing and exit from the wide-ranging policy actions. Clearly, there are broader issues concerning the timing and sequencing of exit from all crisis-related intervention policies, including whether fiscal consolidation should take priority over monetary tightening or otherwise. However, a substantive discussion of these issues is beyond the scope of this paper. Section II of the paper will discuss central bank policy actions at different stages of the crisis, followed by a discussion in of the diversity in approaches pursued by central banks across major advanced and emerging economies. Section III will assess the effectiveness of these policy actions. Section IV will discuss issues in the design of an appropriate exit strategy from extraordinary central bank actions. Section V will provide concluding remarks.

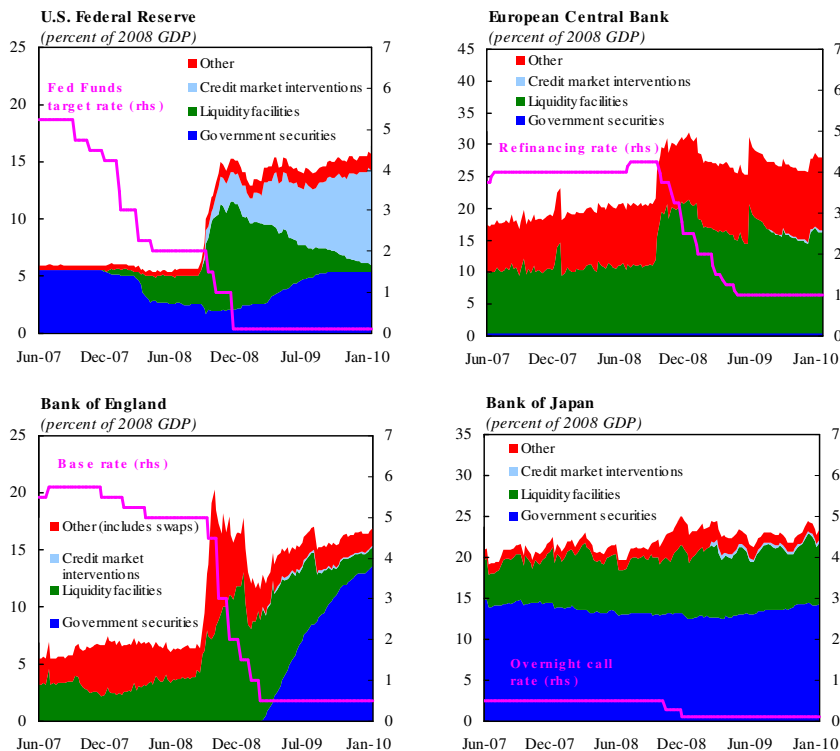
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<sup>1</sup> *The views expressed in this paper are my own, and should not be attributed to the staff, Management or the Board of the IMF.*

## II. THE CRISIS AND CENTRAL BANK ACTIONS

4. In the initial stages of the recent financial crisis, advanced country central banks faced difficult choices. Even as signs of stress appeared in the financial system in the second half of 2007, the problems were perceived to be limited to a few isolated markets, and the main concern at the systemic level was about liquidity. Few people called into question the solvency of the financial system as a whole. Major central banks reacted to the ensuing financial stress by raising the scale of their liquidity-providing operations, while seeking to bolster demand through conventional means, notably by adjusting policy interest rates. Central banks sterilized their liquidity provision to individual institutions through open-market operations, altering primarily the composition but not the size of their balance sheets (Figure 1).

Figure 1. Evolution of Central Bank Assets and Policy Rates



Sources: Haver Analytics and Bank of England.

5. Actions on the policy rate front diverged substantially during the first year of the crisis. This reflected the differences in central banks' assessment of relative risks to growth and inflation, and the impact of the financial crisis on the cost and availability of credit. At

one extreme, the U.S. Federal Reserve (Fed) cut its policy rate quite aggressively<sup>2</sup> to offset the impact of elevated spreads on market rates. At the other extreme, the European Central Bank (ECB) raised its main refinancing rate ¼ percentage points in July 2008 because of concern relating to rising inflation expectations (Trichet, 2009b).

6. Central banks, however, quickly recognized the insufficiency of their traditional tools, both to deal with the collapse of aggregate demand and the freezing of key credit markets, following the intensification of the financial crisis in September 2008. In particular, the sharp reduction of policy rates close to effective lower bounds proved insufficient to stimulate the economy given the size of the shock, the offsetting impact of a drop in inflation expectations on the real rates, and the disruptions in the transmission mechanism from policy rates to private borrowing rates and the real economy. With the capital adequacy of systemically important financial institutions being called into question and wholesale funding markets under stress, commercial banks tightened their lending. At the same time, nonbank financing, particularly via private-label securitization, virtually came to a halt. Access of households and businesses to credit was severely curtailed, while its cost ratcheted up.

7. Under these circumstances, policymakers undertook a number of decisive measures aimed at stabilizing financial markets and institutions and preventing a severe and prolonged contraction in real activity. Steps were taken to guarantee bank liabilities, recapitalize financial institutions, and limit portfolio losses. Large fiscal stimulus packages were adopted to bolster aggregate demand. Central banks acted nimbly, decisively, and creatively in their response to the deepening of the crisis. They embarked on a number of unconventional policy measures, some of which had been tried before, while others were new.

#### **A. Monetary stimulus when policy rates are at “zero bound”**

8. With policy close to the zero bound in key advanced economies, central banks provided additional monetary stimulus through several complementary means, all of which differed in their mechanics and underlying economics and had their respective advantages and drawbacks.

9. *First, some central banks committed explicitly to keeping policy rates low for an extended period.* In the context of rapidly rising market perceptions of policy uncertainty, such action was aimed at anchoring market expectations that monetary stimulus would not be withdrawn until durable recovery takes hold. It was expected that such a commitment would keep inflation expectations from declining, which would in turn prevent a rise in real interest rates and bolster demand. It was recognized that the effectiveness of such action hinged on its

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<sup>2</sup> The target for the federal funds rate was reduced by 325 bps to 2 percent between September 2007 and April 2008. Also, the spread between the primary discount window rate and the policy rate was cut to 25 bps from the usual 100 bps within this time period.

credibility and would have value only to the extent that it restricts future options. If inflationary pressures were to rise earlier than expected, both renegeing on the commitment and sticking to it when interest rate hikes were possibly needed could damage the credibility of the central bank.

10. *Second, central banks across major advanced and emerging economies provided broad liquidity support to financial institutions.* In the context of heightened concerns about counterparty credit risk, uncertainty regarding an institution's own short-term financing needs and the value of assets that could be used as collateral, and the limited supply of high-quality collateral, banks were both unable and unwilling to lend, including to each other, beyond the shortest maturities.

- Central banks aimed to alleviate these constraints by enhancing the scale and scope of their liquidity providing operations. This included lending at longer maturities, broadening the quality of collateral, and expanding the access of their operations to a wider set of financial institutions. Increasing bank reserves through central bank liquidity facilities could be implemented easily as it relies on the ordinary channel of credit creation; does not expose the central bank to significant credit risk and reduces the risk of bank runs; and, if appropriately designed, could be self-unwinding.
- Central banks in major reserve currency countries facilitated foreign exchange funding. In the context of significant constraints with the availability of cross-border foreign exchange funding, several central banks expanded access to their lender-of-last-resort facilities. For instance, the Fed entered into reciprocal currency swap arrangements with other central banks to increase the availability of dollar funding outside the United States. The ECB also signed similar agreements with the central banks of several European countries to improve the provision of euro liquidity to their banking sectors.

11. *Third, some central banks aimed to reduce long-term interest rates across a wide range of financial assets, independent of their risk.*

- To reduce the risk-free rate, central banks purchased longer-term government securities. This was aimed at reducing private borrowing rates, particularly in the context of short-term policy rates being near their lower bound and commitment to keeping policy rates low was not effectively translating into lower long-term interest rates. Because long-term treasuries serve as benchmarks for pricing a variety of private-sector assets, it was expected that interest rates on privately issued securities and loans would also decline as government bond yields decline.
- While there was merit in such action, there was a risk that central bank purchases of government securities may not have a significant impact on long-term yields, notably if they accounted for a small share of the government bond market. It was also

viewed that even if treasury yields fell, this may not have much impact on private borrowing rates and credit market risk premiums, as heightened risk aversion reduces the substitutability between government and private assets.

12. *Fourth, some central banks intervened directly in specific segments of the credit markets.* This was led by the purchase of private assets and by providing loans to financial institutions against private-sector assets that were used as collateral.

- Credit market interventions involved direct support by the central bank in specific segments of credit markets that were experiencing dislocations. Such intervention was aimed at alleviating illiquid trading conditions, reducing liquidity premiums, and establishing benchmark prices. It was also aimed at encouraging origination in the targeted market, including through the purchase of commercial paper, corporate bonds and asset-backed securities. Credit market interventions can generally be useful not only at near-zero, but also at above-zero levels of the short-term nominal interest rate if continued dislocations in the targeted markets are deemed to pose wider threats to the financial or credit system.
- It was viewed by some central banks that providing credit directly to end borrowers may be more effective than going through banks when banks' capacity and/or willingness to lend was impaired. Central banks were selective, targeting particularly important and distressed markets. However, credit market interventions exposed central banks to greater credit risk, although some risk-sharing mechanisms were included in these operations.

#### **B. How did Individual Central Bank Actions Differ?**

13. Since the early days of the financial crisis, all major advanced and emerging country central banks took resolute steps to enhance liquidity provision to the financial system. Their initial reaction was to dramatically increase the size of liquidity operations, followed by steps to broaden the scope of current operations and the 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, while 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 repurchase operations.<sup>3</sup>

- In the initial phase of the crisis, even as monetary authorities sought to improve money market functioning, their liquidity providing efforts were offset by liquidity

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<sup>3</sup> The ECB—which even before the crisis had a large list of counterparties for 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.

draining over the course of their respective maintenance periods, so that no significant 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>4</sup> However, following the intensification of the crisis in Fall 2008, central banks accelerated policy rate reductions and began expanding their balance sheets to support credit more directly.

14. Other than in the provision of liquidity, there was considerable diversity in approaches taken to date among the G-7 central banks (Figure 1). The Fed advanced far ahead in terms of intervening in impaired credit markets, 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 U.S. government-sponsored enterprises (GSEs) to bring down their yields and encourage investors to switch to riskier assets. These actions were aimed at reducing long-term funding costs, especially residential mortgage rates. The Fed also set up facilities to support the commercial paper market by buying such paper directly from issuers or through money market mutual funds. Finally, through the Term Asset-Backed Securities Lending Facility (TALF), the Fed 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 has not only 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.”

15. The Bank of England rivaled the Fed in the size of the balance sheet expansion, but its approach has been quite different.<sup>5</sup> Although 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 2). In particular, the BoE was 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 a 3-month Asset Purchase Program (APP) to purchase £75 billion worth of assets, mostly medium and long-term U.K. government notes and bonds (gilts). Subsequently, it extended the term and scaled up the target amount twice to around £175 billion. This amounted to 41 percent of outstanding gilts in the relevant maturity range and nearly 80 percent of planned debt issuance in FY2009. The £50 billion credit easing component of the Bank’s unconventional policy authorized the BoE to purchase a broad range of high-quality private

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<sup>4</sup> Central banks were also involved in more direct rescue operations for several large banks and other financial institutions.

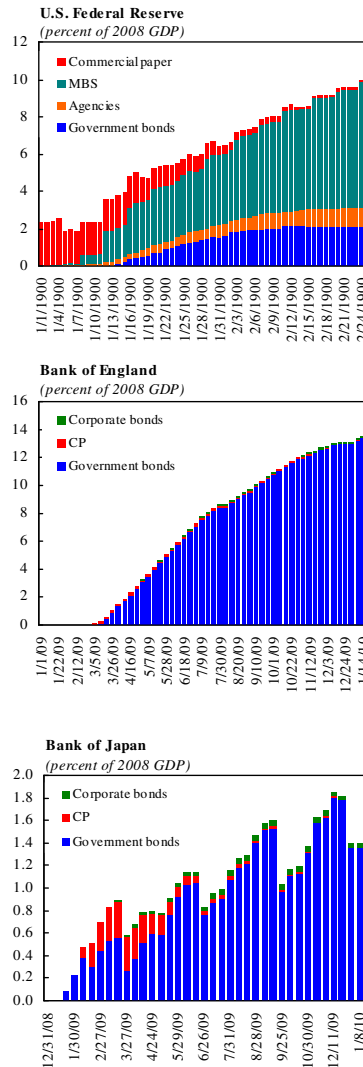
<sup>5</sup> See Meier (2009) for an in-depth analysis of the Bank of England’s unconventional policies.

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.

16. 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 focused largely on money creation via purchases of government bonds. However, the scale of operations is much 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, 2009. 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.

17. In addition to increasing bank reserves through government bond purchases in a manner reminiscent of its policy in the early 2000s 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. To further enhance easy monetary conditions, the BoJ introduced a new funds supplying operation in December 2009.

**Figure 2. Outright Holdings of Securities by Central Banks 1/**



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

18. 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 mid-2009, the ECB had not supported credit markets directly, but it greatly facilitated issuance of private securities and provision of certain types of loans by accepting them as collateral in its refinancing operations. It has gone the furthest among major central banks in expanding the range of acceptable collateral and the term of its liquidity providing operations.<sup>6</sup> It auctioned off an unprecedented €442 billion of one-year funds at one percent in late June and another €75 billion in late September. Finally, to support the housing market, the ECB has initiated a €60 billion program to buy covered bonds over the course of 12 months, with purchases starting in July 2009.

19. 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, 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 2010, pioneering the communication of a specific end date for this type of guidance. While expanding its liquidity operations, the Bank of Canada has taken very limited steps in the other areas, but it preemptively put together a framework for quantitative and credit easing and indicated that it is prepared to use such instruments if needed to achieve its inflation objective.

20. Crisis intervention measures of central banks in emerging economies differed from those of advanced economies in timing, focus and magnitude. In particular, most of the intervention measures were put in place following the intensification of the crisis in September 2008, and focused largely on the provision of foreign exchange liquidity and cuts in policy rates. Moreover, the magnitude of intervention measures were smaller, reflecting in large part the fact that financial sectors in emerging economies experienced significantly less stress compared with those in the major advanced economies, but also a concern that excessive monetary easing would exacerbate pressure on their currencies.

- EM central banks eased the terms of existing foreign exchange liquidity facilities and introduced some new ones. This included maturity extension of foreign exchange swaps and introduction of new facilities providing foreign exchange repos, loans or swaps. In some cases, access to these facilities was widened to include nonbank financial institutions and key non-financial institutions. Many EM central banks opened foreign exchange selling auctions and relaxed foreign exchange liquidity or borrowing limits, as well as lowering the required reserve ratios for bank foreign currency liabilities.

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<sup>6</sup> Even before the crisis the ECB accepted a broader range of collateral—including even commercial bank loans—than other major central banks.

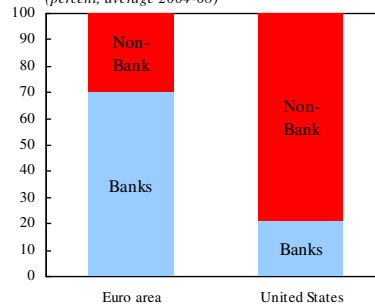
- To support their foreign liquidity operations, a number of EM central banks entered into currency swap arrangements with reserve currency central banks.
- Some EM central banks acted indirectly to alleviate credit strains, including by guiding banks to use the liquidity freed by lower reserves requirements for lending to the private sector.

### C. What Explains the Divergence in Central Bank Actions

21. What can account for the considerable difference in the extent to which 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 differences in responses can be attributed to the differences—real or perceived—in the countries’ circumstances. Such circumstances include the depth and timing of recessions or slowdowns in individual countries, the relative roles played by banks and capital markets in credit allocation, the severity of the problems in the financial system, the flexibility of preexisting institutional arrangements, political environments and structures, and actions taken by the nonmonetary authorities.

22. 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, since the nonfinancial private sector in Europe relies much more on the banking system for credit than on securities markets (Figure 3), the authorities’ efforts appropriately focused on ensuring the banks are strong and have adequate resources to lend. Even in the United Kingdom, outstanding corporate bonds of domestic nonfinancial issuers total about £15 billion, with another £7 billion in commercial paper, so even the fairly small allocation for private assets under the APP amounted to a non-negligible share of these markets.<sup>7</sup>

**Figure 3. Sources of Financing for Corporations 1/**  
(percent, average 2004-08)



Source: ECB Monthly Bulletin, April 2009.

1/ Breakdown of the sources of external financing of non-financial corporations.

<sup>7</sup> However, the market is much larger if financial issuers and foreign corporations issuing sterling debt are included.

Moreover, with a broad access to its lending window to begin with, there was less need for the ECB to introduce new facilities.

23. Canada has been one of the few countries whose financial system was not damaged severely by the financial crisis. As a result, the Bank of Canada could afford for a considerable length of time to rely largely on conventional measures to support the economy in the face of external shocks. However, when global economic prospects weakened significantly in 2008 and risk aversion rose, Canadian banks tightened credit conditions. With no room for interest rate cuts, the BoC sought to guide interest rate expectations, and put in place a framework for quantitative and credit easing. In a similar vein, although Japan's financial institutions were not highly exposed to U.S. toxic assets, their losses on stock holdings and expected rise in delinquencies made them reluctant to lend, prompting the Bank of Japan to initiate some limited credit easing measures.

24. 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. Guarantees of bank debt and deposits decreased bank reliance on wholesale funding such as through commercial paper and repurchase agreements. In certain countries, the government has taken a leading role in providing support 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, as well as term asset-backed securities. In the U.K., the government is leading the effort to restart residential mortgage securitization through its guarantee program, and the Development Bank of Japan has started outright purchases of commercial paper.

25. It should be noted that while all central banks pledged prudence in their credit easing operations, there is considerable differentiation in their exposure to credit risk. The Fed has accumulated the largest portfolio of risky private-sector securities among the major central banks, with the understanding, initially implicit, but later partly formalized in the setup of the CPFF and TALF and in a joint Fed–Treasury statement, that ultimately the Fed's losses, if any, will be borne by the government.<sup>8</sup> In the U.K., 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. The supranational nature of the European Central Bank may have contributed to its reluctance to buy assets.

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<sup>8</sup> The Fed is protected against losses by its focus on purchasing highly rated securities, overcollateralization, and the government's support for the GSEs.

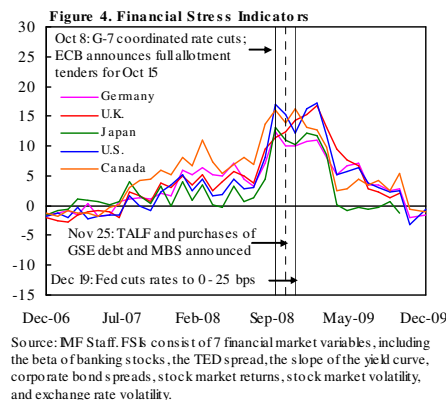
### III. EFFECTIVENESS OF CENTRAL BANK ACTIONS

26. Taken collectively, policy actions, notably by major advanced country central banks, contributed to the reduction in systemic tail risks following the bankruptcy of Lehman Brothers and to improvements in market confidence and risk appetite. However, financial indicators suggest that some policies are proving to be more successful than others.

27. 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 crisis period. Moreover, it is difficult to determine what would have happened if central banks had not taken action, especially given the relatively low level of market confidence that prevailed following the onset of the crisis. 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 bank actions have helped reduce tail risks and financial conditions have improved, but the bank lending channel remains strained*

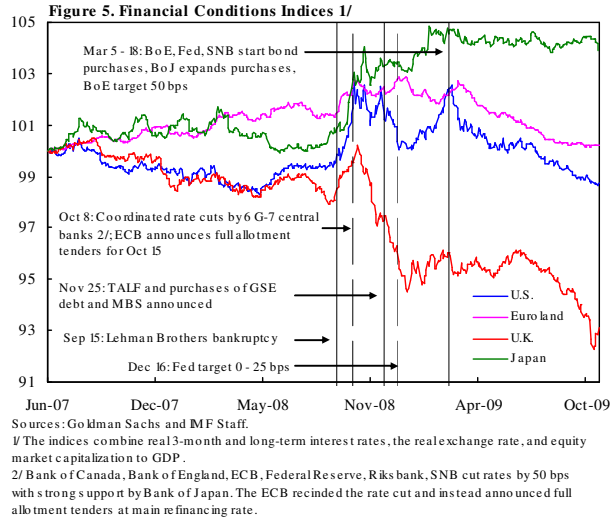
28. Forceful monetary easing and virtually unlimited offers of liquidity by major central banks have helped to reduce the extreme financial stress and tightness in financial conditions that prevailed following the bankruptcy of Lehman Brothers. Moreover, a few authorities, like the Federal Reserve and Swiss National Bank, directly participated in the rescue efforts for specific large, highly interconnected financial institutions.<sup>9</sup> As a result, the IMF's financial stress indices (FSIs, Figure 4)<sup>10</sup> for the major advanced economies have declined, with some falling below their pre-crisis levels. Central bank efforts have helped to reduce the systemic tail risks, including the potential for cascading insolvencies in the financial sector. Broad measures of financial



<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 seven 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 and others, 2009).

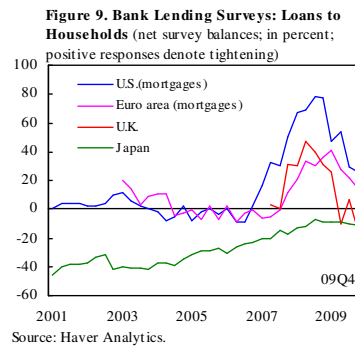
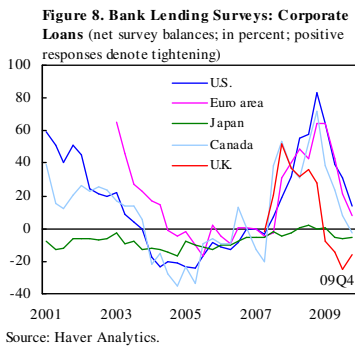
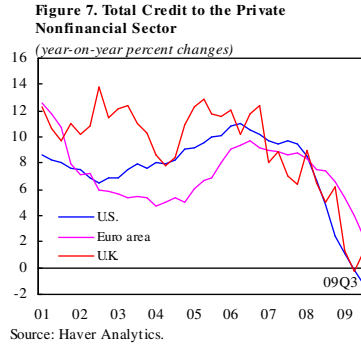
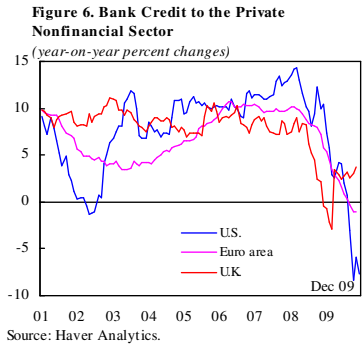
conditions (Figure 5) have also improved, partly due to the significant drop in real short-term rates. However, conditions remain tight relative to their pre-crisis levels, especially for some regions where higher real effective exchange rates and lower equity market capitalization (in Europe and Japan) have offset the decline in interest rates.



29. 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. Although many mature market banks have increased their capital adequacy via public and private capital raising, these efforts appear to have primarily stabilized the banking system, but not enough capital has been raised to adequately support lending and the economic recovery.<sup>11</sup> Bank lending to the private non-financial sector remains restrained across major advanced economies (Figures 6 and 7). Still, were it not for official interventions, credit flows would likely have fallen much more—beyond comparison with any other postwar 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 nonfinancial firms, albeit not as vigorously as at the peak of the crisis (Figures 8 and 9). In the United Kingdom, standards for corporate lending loosened slightly in 2009, but remain tight nonetheless. In contrast to these swings, lending standards in Japan

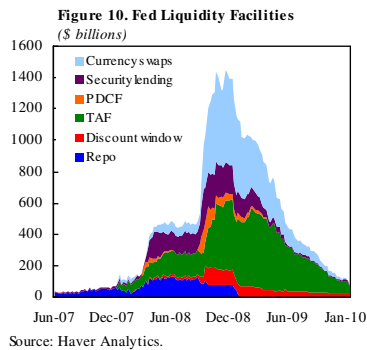
<sup>11</sup> The October 2009 GFSR explains (p. 27) how the lending capacity of banks in the euro area, the United Kingdom, and the United States is projected to decline in both 2009 and 2010, contributing to a potential ex-ante gap between total nonfinancial borrowing needs and the total capacity of the system to provide credit.

have largely remained on the pre-crisis trajectory of moderating loosening, with standards for large corporations reaching the neutral point.



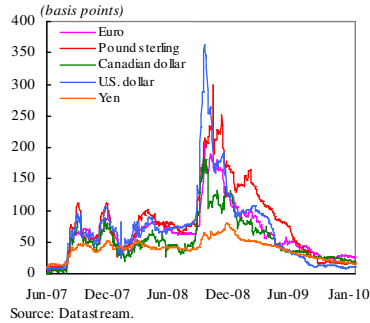
*Funding strains are easing, but the money market complex is contracting*

30. Central banks have eventually been successful in reducing term premiums in money market rates and increasing the availability of short-term financing. The record low levels of target policy rates and generous liquidity providing operations have contributed to the steep reductions in LIBOR, repurchase, and commercial paper (CP) rates and their risk premiums, as well as a narrowing in foreign exchange swap basis. Reflecting this reduction in liquidity risk, use of central bank liquidity facilities has generally been falling lately (Figures 3 and 10).



- 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 11). 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 nonfinancial 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 12 and 13).<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 longer-lasting increase in the price of credit risk embedded in uncollateralized money market rates.

Figure 11. Three-month LIBOR-OIS spreads



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Figure 12. U.S. Credit and Liquidity Strains I/ (basis points)

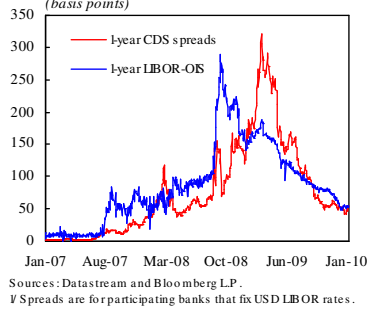
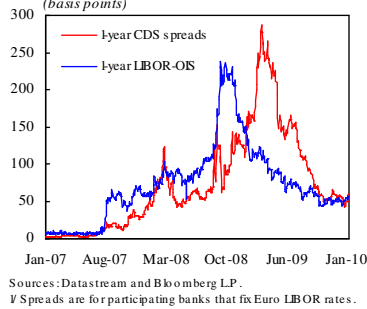


Figure 13. EU Credit and Liquidity Strains I/ (basis points)

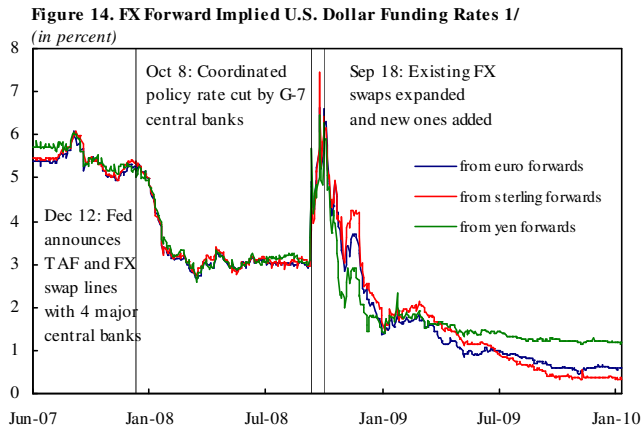


- The Term Auction Facility<sup>13</sup> and currency swap arrangements between the Fed and 14 central banks have helped to enhance the functioning of the foreign exchange swap and

<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.

<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 other studies by Sack and Meyer (2008) and McAndrews, Sarkar, and Wang (2008) refute that conclusion. A fourth study by Hooper and Slock (2009) concluded that the announcement effect of the TAF was the most important, whereas the TSLF was not significant in narrowing the LIBOR-OIS spread.

forward markets. These markets had become dislocated as financial institutions, especially those without access to Fed 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 6.6 percent and 7.4 percent, respectively. By January 2010, these rates had fallen to below 1 percent (Figure 14).



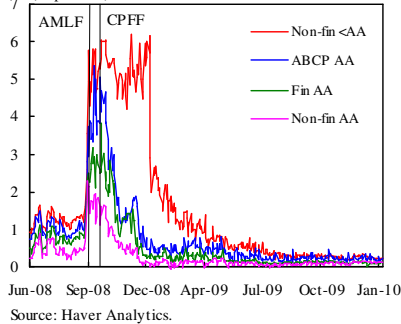
Sources: IMF staff calculations and Bloomberg L.P.

1/ 3-month U.S. dollar funding implied by FX forward and labor rates.

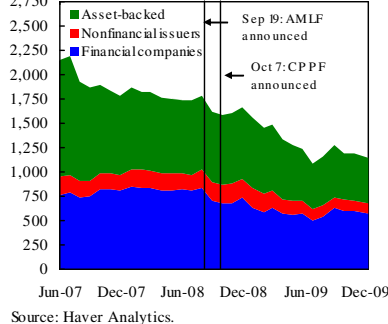
- Commercial paper rates have fallen in advanced economies, driven in part by direct purchases and liquidity operations by the Fed, BoE, and BoJ targeted at short-term corporate financing. Both the highest and the lower tiers of CP rates are down,<sup>14</sup> although for several months following the introduction of intervention measures there was a wide positive spread between the higher and the lower tiers (Figure 15). In the United States, the amount of CP outstanding has been contracting, notwithstanding temporary increases following the announcements of the AMLF and the CPFF (Figure 16). This largely reflects a fall in demand for CP funding since banks have alternative funding sources via government guaranteed debt, to a lesser extent non-guaranteed note issuance, and increased deposits. 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.

<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.

**Figure 15. U.S. Commercial Paper Spreads over T-bill**  
(in percent)



**Figure 16. U.S. Commercial Paper Outstanding**  
(\$ billions, sa)



- Term repurchase (repo) rates have declined in G-7 countries due in part to central bank operations to aid 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 wider 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 nontraditional collateral for repos during most of the crisis. Despite lower repo rates, 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.

31. 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 long lasting 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.

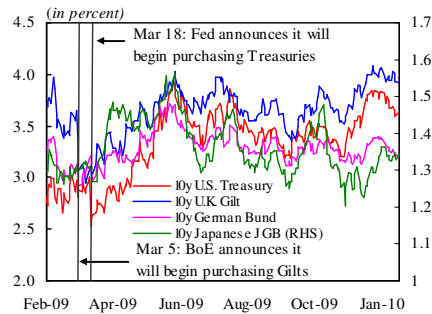
*Central banks’ efforts to reduce longer-term rates have had more mixed results*

32. 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 than others. Yields on government bonds have increased over the last several months despite sizeable purchases by a few major central banks. The spreads between private asset yields and treasuries have declined both in the markets with major central bank support, such as the 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 of 2009 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.

- 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 intermediate-dated yields on U.S. and U.K. government bonds immediately following the announcement of large bond purchase programs by the respective central banks (Figure 17), most global yields are much higher than their post-announcement levels. In particular, between the announcement date on March 18 and January 25, 2010, 10-year U.S. Treasury yields have risen by about 109 bps. In contrast, Japanese government bond (JGB) and U.K. gilt yields moved by much less since the BoJ and BoE first made announcements regarding outright purchases of governments bonds during the crisis,<sup>15</sup> although 5-year gilts increased 47 bps since March 4, 2009 due in part to the BoE's announcement that it would suspend its purchases of 5- and 12-year bonds as of late June. In Germany and Canada, whose central banks have not engaged in purchases of government bonds, 10-year yields rose about 20 and 40 bps, respectively, between the ECB's and BoC's March monetary policy meetings and January 25, 2010.
- 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 spread between longer-term and short-term interest rates has been lower than predicted—even though the ECB is not buying government bonds. They attribute that deviation to the enhanced credit support provided by the ECB, although other explanations cannot be ruled out.

**Figure 17. Ten-year Government Bond Yields in the U.S., U.K., Germany, and Japan**

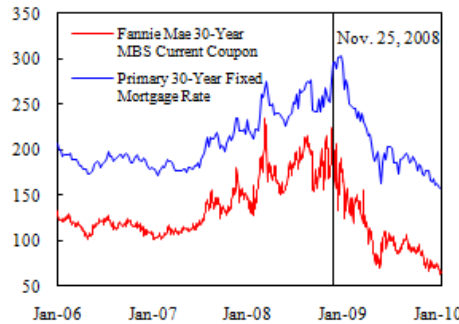


Source: Bloomberg L.P.

<sup>15</sup> The BoJ announced the first increase to its JGB purchases on December 19, 2008, and the BoE announced its asset purchase facility on March 5, 2009.

The Fed's purchases of the mortgage-backed securities (MBS) and direct obligation of the U.S. government-sponsored enterprises (GSEs) appear to be having their intended effect. Most notably, the spreads of both the 30-year fixed-rate mortgage and MBS to 10-year Treasuries have declined progressively since the asset purchase program was first announced in November 2008. Similarly, the prepayment option-adjusted spread to Treasuries has narrowed by 75 basis points over the same period. At the height of the financial crisis, and as the housing market became distressed, the spread increased to 150-175 basis points. Currently, the nominal spread between agency MBS and Treasuries is around 60 basis points, compared to 100 basis points historically (Figure 18). 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, and those on jumbo yields have declined more (Figure 19). Additionally, there was a large jump in refinancing as conforming mortgage rates fell below 5.0 percent, but this activity has slowed. Moreover, since November 2008 there has been very little private buying interest in agency MBS, leaving the Fed to purchase a significant share of new issuance (Figure 20).

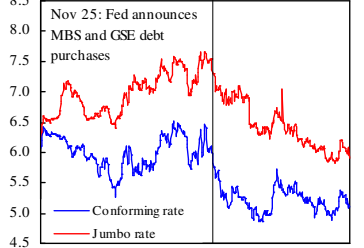
**Figure 18. Effects of Fed MBS Purchases**  
(spread to 10-year U.S. Treasury; in basis points)



Sources: Merrill Lynch, Freddie Mac, Primary Mortgage Market Survey; Bloomberg L.P.; Board of Governors of the Federal Reserve System, and Haver Analytics.

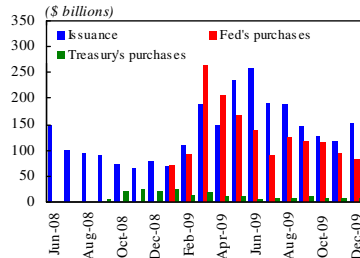
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**Figure 19. U.S. Mortgage Rates**  
(30-year fixed, in percent)



Source: Bloomberg L.P.

**Figure 20. U.S. Agency MBS: Issuance and Official Purchases**  
(\$ billions)



Sources: U.S. Federal Reserve, U.S. Treasury, and SIFMA.

- 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 uses its program primarily as a backstop to potential dislocations in the U.K. corporate bond market. Despite the small amounts purchased, the BoE's program has contributed to the narrowing of U.K. corporate bond spreads on the margin. The main reason for tightening corporate credit spreads is the broader 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 markets may still be warranted. The BoJ focuses its purchases on bonds with up to one year in maturity. They are part of the BoJ's efforts to enhance corporate funding conditions, and are not geared toward lowering longer-term corporate bond yields or credit premiums.

- Resuscitating securitization markets through the Fed's TALF is proving to be challenging. Secondary market spreads on highly rated consumer asset-backed securities (ABS) and commercial MBS (CMBS), and to a lesser extent mortgage-related ABS, have narrowed considerably since the announcement of the TALF and the eligibility of CMBS for TALF funding (Figure 21). However, 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. The Fed's efforts have helped new issuance of consumer ABS to normalize (Figure 22). New CMBS issuance, however, remains virtually nonexistent (Figure 23). TALF funding for CMBS has been used primarily for the purchase of legacy CMBS, rather than newly originated securities.

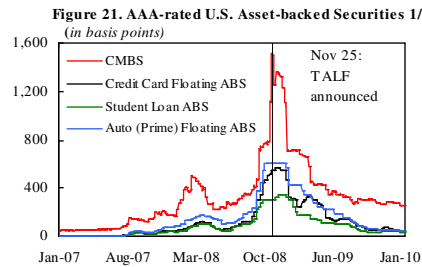


Figure 21. AAA-rated U.S. Asset-backed Securities 1/ (in basis points)  
 Source: J.P. Morgan  
 1/ Spread to 1 month LIBOR for credit card, auto, home equities, and student loan 3 year ABS. Spread to synthetic 3 year Treasury for 3 year CMBS.

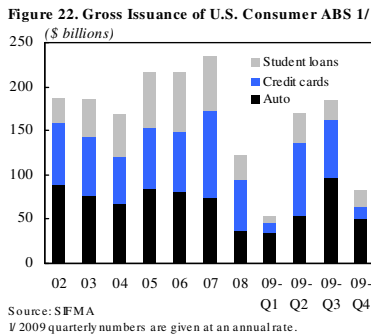


Figure 22. Gross Issuance of U.S. Consumer ABS 1/ (\$ billions)  
 Source: SFMA  
 1/ 2009 quarterly numbers are given at an annual rate.

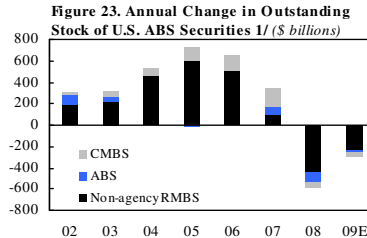
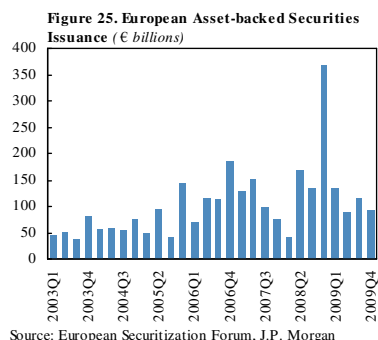
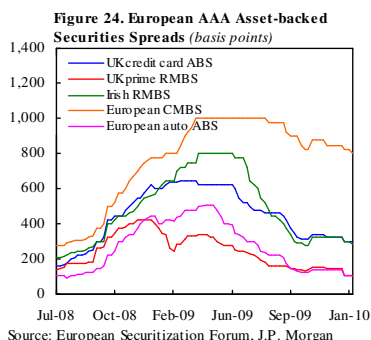


Figure 23. Annual Change in Outstanding Stock of U.S. ABS Securities 1/ (\$ billions)  
 Sources: Thomson Financial, Bloomberg, SFMA, Loan Performance, Trepp, and J.P. Morgan.  
 Note: ABS include autos, student loans, and credit cards. CMBS reflect conduit issuance. RMBS include subprime, Alt-A, and prime. 2009 estimate uses 2009Q3 figures vs 2008Q4 for RMBS and ABS to calculate the annual change.

- 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 U.K.'s official program to guarantee new issuance of securitized products is run by H.M. Treasury. Secondary market spreads in U.K. and European ABS and residential MBS markets remained on an upward trend until the first half of 2009 amid concerns about credit deterioration in their underlying collateral. Spreads only started to improve significantly after the ECB extended the term of its fixed rate, full allotment liquidity operations to one year (Figure 24), and the origination of privately distributed ABS has been limited. Total 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 25). For all of 2008, market participants estimate that 98 percent of new issues were retained by issuers. However, more recently a few banks have begun to issue privately distributed ABS.



- The ECB's program to purchase €60 billion of European covered bonds has led to improvements in that market. Credit spreads have narrowed since the ECB's announcement in early May and issuance volumes have risen.

#### IV. EXITING FROM CRISIS-INTERVENTION MEASURES

##### A. General Considerations—Timing and Sequencing

33. The global recovery is off to a stronger start than anticipated earlier, but is proceeding at different speeds in the various regions. Following the deepest global recession in recent history, economic growth returned and broadened to advanced economies in the second half of 2009, and world output is expected to rise by 4 percent in 2010. In most advanced economies, the recovery is expected to remain sluggish by past standards, with there being no clear signs that domestic demand is self-sustaining. In contrast, activity is expected to be relatively vigorous in many emerging and developing economies, largely driven by buoyant internal demand.

34. A multi-speed recovery implies differentiation in the timing and sequencing of exit from crisis-related intervention policies. But policymakers in all countries should remain proactive in preparing for exiting from extraordinary stimulus, recognizing the challenge of mapping a course between exiting too early and too late. Unwinding stimulus too early could jeopardize progress in securing economic recovery, while maintaining it for too long could distort private incentives and pose risks to price, financial, and fiscal stability.

- Notwithstanding the recent uptick in growth prospects, recovery in the major *advanced economies* will remain sluggish, underpinning the need for continued policy stimulus until private demand gathers momentum on a sustainable basis. Central banks in these economies should maintain low interest rates until end-2010, given that underlying inflation is expected to remain subdued and unemployment high for some time. Similarly, fiscal policies need to remain supportive of economic activity in the near term, and the fiscal stimulus planned for 2010 should be implemented fully.
- In contrast, however, in some *major emerging economies* in Asia and Latin America, output gaps are rapidly closing. There are also nascent signs of asset price booms and, in some cases, deteriorating credit quality. In these economies, stimulus may need to be unwound soon.

35. There are also differences in the sequencing of exit from various intervention policies. In several of the major advanced economies, ensuring fiscal sustainability is a key priority and policy challenge, notably in light of the surge in government debt levels. The long implementation lags in fiscal policy means that policy change will have to be initiated earlier rather than late. By contrast, maintaining an accommodative monetary policy stance does not have a similar downside because it can be reversed quickly and poses few risks in the current inflation environment. Also, a tightening of the fiscal stance may help monetary management, while a monetary tightening could contribute to a worsening of the fiscal position. Hence, fiscal consolidation should generally take priority, particularly in countries that need to raise national savings. Achieving fiscal sustainability will be a difficult and prolonged process, making it imperative for consolidation to begin as soon as there is clear evidence of self-sustaining recovery. Given a path for fiscal policies, monetary policy can be set to achieve a desired level of overall stimulus, tightening as needed to counter inflationary risks and maintain price stability.

36. In major emerging (and some advanced) economies experiencing faster recoveries, including those with large fiscal space, the desirable policy mix may be different. For economies that have relied on export-led growth and with sufficient fiscal space, rebalancing from external to domestic demand may require additional measures to reduce precautionary savings, through further efforts to strengthen social safety nets, pension and healthcare systems reforms, and improvements in corporate governance. In countries with excessive current account surpluses, monetary conditions may have to be tightened relatively soon (notably through currency appreciation), and might therefore lead fiscal consolidation, owing to rising inflation or incipient financial vulnerabilities. Monetary tightening may be more complicated in countries with broadly balanced external positions, as it could amplify exchange rate pressures. These economies may have to consider macroprudential measures and fiscal tightening and, under some circumstances, reserve accumulation and restrictions on capital inflows.

## B. Exiting from Central Bank Policy Actions in Advanced Economies

37. 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 sustained recovery in private demand that could anchor a durable recovery and underlying inflation remains contained. However, when financial conditions normalize further and activity gains greater momentum, monetary stimulus will need to be withdrawn consistent with maintaining the economy at potential and avoiding inflation. Although complex technical and conceptual issues are involved, central banks have adequate tools to control monetary conditions during the exit.<sup>16</sup>

38. 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 and to forestall inflation. At the same time, 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 their exit strategies to the markets.

39. Maintaining price stability should be a key objective. 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 (Figure 26). In major advanced economies, such concerns are not justified at this stage of the economic cycle, notably because of large output gaps. Moreover, in many advanced economies, financial stability remains fragile and/or key markets are not yet functioning normally, underscoring the need for central banks to maintain crisis-intervention measures or possibly introduce new ones, even within the context of an overall tightening of the monetary policy

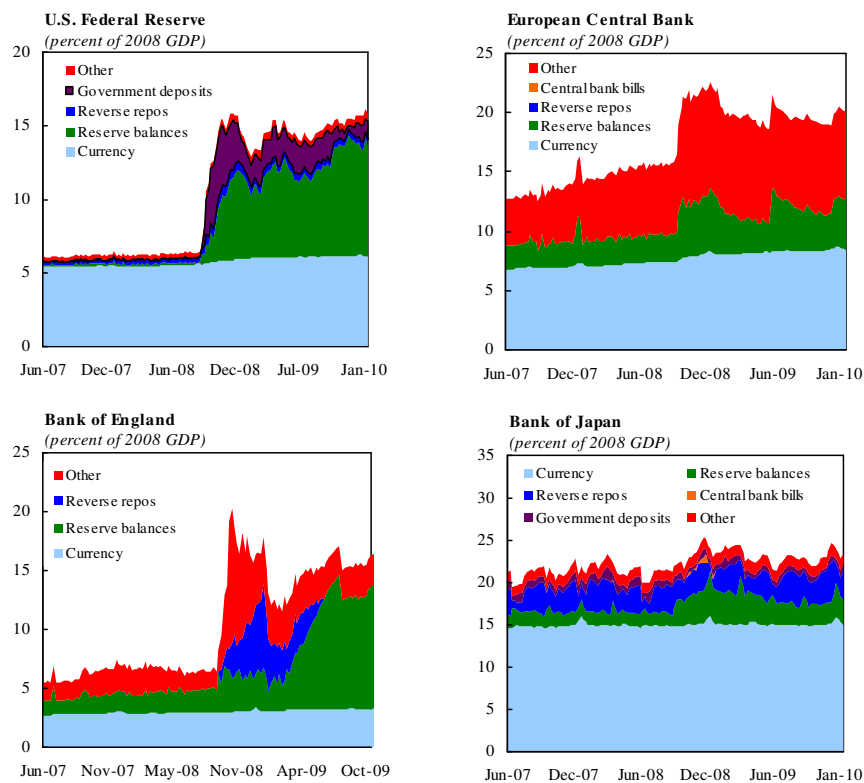
**Comment [v2]:** Are you taking Figure 26 out? It shows the growth of reserves. I would keep it, just move it closer. In any case, now you've lost the reference, but the Figure is still in the text.

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<sup>16</sup> Cottarelli and Viñals (2009).

stance.

**Figure 26. Evolution of Central Bank Liabilities**



Sources: Haver Analytics and staff estimates.

### **Raising policy interest rates need not await the unwinding of balance sheet policies.**

40. 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. The rapid buildup of aggregate reserves in the banking system has led 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 rates even if their balance sheets are substantially above pre-crisis levels. 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.

**Unwinding unconventional measures may be more challenging, but some of it is already happening.**

41. 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. That said, some unconventional measures will unwind naturally as market conditions normalize, but others that are centered on purchases of assets and are longer term in nature and less liquid could be difficult to wind. 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 United Kingdom). The composition of central bank assets will in part determine the approach to be taken.

42. Short-term credit operations—where the scale of intervention is determined by private demand—have already started to unwind naturally as market conditions normalize, and central banks can scale back access gradually existing facilities or introduce new liquidity-absorbing instruments.<sup>17</sup> The Fed announced that it would let some of its special liquidity facilities expire early in 2010, and the ECB and Bank of Canada recently announced that they would shorten the maturity of liquidity providing operations.

- 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 currency swaps have shrunk as dollar funding in non-U.S. markets has improved, and the swap facilities were allowed to expire on February 1, 2010. 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>18</sup>

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<sup>17</sup> Central banks will want to restore much of the pre-crisis monetary operations framework, including using a single short-term interest rate. Some of the crisis measures may be worth retaining—such as the widening of counterparties—because they addressed structural, pre-crisis inefficiencies and are unlikely to exacerbate vulnerabilities in the future.

<sup>18</sup> The size of TAF and TSLF auctions has been reduced recently in response to flagging demand.

43. The unwinding of medium- and long-term asset purchases may, however, be a slower process. Unwinding public sector security purchases involves flow and stock decisions. Ending purchases of public sector securities—the flow decision—might be taken as a signal that a robust economic recovery is under way. This step should therefore be taken with some caution, and communications might emphasize flexibility in the face of changing market conditions. Since purchases of public securities are aimed at influencing overall credit conditions, the decision to slow or stop them must be based not just on market information on the securities themselves, but also on broader indicators such as lending surveys and the growth of credit to the non-financial private sector. Management of central banks' increased holdings of public securities—the stock decision—will be a long-run issue. Large-scale sales could raise the yield curve and widen market spreads. Potential disruptions could be minimized by selling excess holdings on a regular pre-announced basis. Therefore, selling these securities can be expected to take place over the long-term. If sales risk disrupting the market and the central bank wants to absorb liquidity, these securities could be used as collateral for short-term liquidity absorbing instruments.

44. Unwinding private securities is likely to be more challenging, since this could affect adversely conditions in specific financial markets. Rolling back new purchases—the “flow” decision—can be based primarily on market indicators. Credit spreads for the targeted markets, use of the facilities, and overall issuance volume (excluding central bank purchases) could be used to help guide when and how to stop purchases.

- The “flow” considerations are similar to those for public sector securities. However, the “stock” decision is more difficult. Given the large size of many credit-easing programs involving the purchases of long-term assets, including corporate bonds and agency securities, it may 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.
- On the one hand, there may be merit in central banks holding some assets to maturity, which would help avoid capital losses and not jeopardize economic recovery, even if it implies expanded balance sheets for an extended period of time. On the other hand, however, holding these securities on their balance sheet exposes central banks to significant credit risks, and transfers resources to specific economic sectors or even individual counterparties.
- Central banks can pay interest on banking system reserves as a key tool to control monetary conditions, notwithstanding expanded balance sheets.

45. 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, accept term deposits from

commercial banks, 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 to make a serious dent. Alternatively, fiscal authorities could issue financial obligations, drawing liquidity from the banking system, and deposit proceeds at the central bank, as in the U.S. Supplementary Financing Program. 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 where they do not already have such authority.

#### **Careful and consistent communication is essential**

46. During the unwinding, there will be an unusually high premium on effective and innovative policy communication. The potential for confusion will be great. For example, reducing liquidity support for specific markets may give the erroneous impression that monetary policy is being tightened. Conversely, raising policy interest rates could lead to a questioning of the commitment to maintaining support for stressed markets. Central banks will need to lay out a general strategy to remove crisis measures and carefully explain the significance of different actions. They might also aim at a more internationally comparable terminology, while still taking account of national differences in policies and their implementation.

#### **Ensuring that unwinding does not compromise central bank independence**

47. Governments should design the unwinding strategy so as to assure the independence of central banks. The large and protracted increase in public debt in many countries might eventually lead to pressure on some central banks to relax their commitment to price stability. Governments may also be tempted to pressure central banks to maintain or expand market support measures taken during the crisis. To avoid a return to damaging high inflation and preserve policy credibility, all the key dimensions of central bank independence—institutional, operational, and financial—need to be respected and reinforced where necessary. Government support of central bank independence and price stability through the appropriate statements and actions will also be important, including the restructuring of central bank balance sheets, when necessary.

#### **C. Addressing international spillovers of differentiated exit**

48. Differentiation in the timing and sequencing of exit will have spillover effects, which will need to be managed. Clear differences have emerged in the pace of economic recovery, and countries will need to exit from intervention policies as best suits the states of their economies. Although domestic considerations are likely to be the main determinant of exit policy choices, these also generate important international spillovers. For instance, the

accommodative monetary stance of advanced countries can generate unwanted levels of capital flows into economies with higher yields.

49. Depending on the problems at hand and local circumstances, such inflows may be addressed through a mix of the following policies. Allowing for more flexible exchange rates could play a valuable role. Stronger currencies in economies with large surpluses could facilitate the needed shift in productive resources from tradable to nontradable sectors, while depreciations in deficit economies would assist the adjustment away from overstretched domestic demand. Sterilized interventions may limit exchange rate appreciations temporarily, but they bring potentially large quasi-fiscal costs, and, moreover, may actually promote inflows by raising expectations of large future appreciations. Implementing new or tightening existing prudential measures could help address financial system stress resulting from capital flows. Finally, applying direct controls over capital flows (whether inflows or outflows) may reduce gains to carry-type trades. Effectiveness, however, may be temporary.

## V. CONCLUSIONS

50. The financial crisis and the associated sharp contraction in economic activity compelled central banks to employ a wide range of crisis-intervention measures, in many cases unprecedented. This included the cutting of policy rates to near zero and the use of several unconventional measures. 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.

51. 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 bank balance sheets the most in the United States and the United Kingdom. However, the Bank of England has relied primarily 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. EM central banks have largely focused on policy rate cuts and liquidity provision in response to the crisis. 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.

52. Central bank interventions, along with government actions, have been broadly successful in stabilizing financial conditions. While stress indicators still remain at elevated levels, tail risks have declined dramatically and funding strains have eased. Ample liquidity provision helped avoid a meltdown in the financial system, while direct support of credit flows to borrowers and investors in disrupted markets and indirect support through

broadening collateral eligibility requirements appears have been successful in alleviating pressure and propping demand.

53. Policymakers in all countries should remain proactive in preparing for exiting from extraordinary stimulus, recognizing the challenge of mapping a course between exiting too early and too late. Central banks need to prepare and clearly communicate credible strategies for unwinding the extraordinary monetary policy support. Unwinding should be tractable and central banks have the tools needed to tighten policy, but there will be challenges. The key objective will be to maintain price stability. However, where financial stability remains fragile, or key markets are not yet functioning, central banks may need to maintain crisis-intervention measures or possibly introduce new ones, even within the context of an overall tightening of the monetary policy stance. Central banks will need to unwind conventional and unconventional measures at different paces. Some unconventional (or “balance sheet”) measures are already being unwound, as funding markets improve and certain facilities expire or run off automatically. Central banks can further tighten the parameters of existing facilities, or introduce new liquidity-absorbing instruments, if tightening is needed before central bank balance sheet have been restored to normal levels. Reducing central banks’ exposure to assets associated with credit easing operations and private or quasi-sovereign financial instruments will depend on the state of financial markets and may take considerable time.

54. In designing appropriate exit strategies, there are other key considerations, which will need to be thought-through and internalized, where relevant. These include effective and innovative policy communication, ensuring the independence of central banks, and managing the spillovers from a differentiation in the timing and sequencing of exit.

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