INTERNATIONAL MONETARY FUND

Central Banking Lessons from the Crisis[1]

Prepared by the Monetary and Capital Markets Department

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Glossary

AIG	American International Group
BoC	Bank of Canada
BoJ	Bank of Japan
BoE	Bank of England
RBA	Reserve Bank of Australia
ECB	European Central Bank
Fed	Federal Reserve
FSB	Financial Stability Board
FX	Foreign exchange
LOLR	Lender of last resort
OMO	Open market operations
TAF	Term Auction Facility

EXECUTIVE SUMMARY

The crisis brought the financial system to the verge of systemic collapse and raised the prospect of depression and deflation. Central banks helped defuse these threats, including through exceptional measures. Considerable efforts are now under way to draw policy lessons from the crisis. For central banks, the crisis seems to provide three important lessons for policy frameworks—mainly concerning systemic financial stability.

First, financial stability should be addressed mainly using macroprudential policies. They can mitigate the procyclicality of systemic risk and the build-up of structural vulnerabilities. Macroprudential tools include capital requirements and buffers, forward-looking loss provisioning, liquidity ratios, and prudent collateral valuation. All potentially systemic institutions and markets should be within the macroprudential regulatory perimeter. Central banks should play a key role, whether or not they serve as the main regulator. However, much work remains to be done to develop full-fledged macroprudential frameworks, including operational tools and governance and institutional arrangements.

Second, price stability should remain the primary objective of monetary policy. Central banks have maintained the price stability credibility they gained before the crisis and this public good must be preserved. The monitoring and analysis of financial system developments and risks can be better integrated into the formulation and implementation of monetary policy.

Third, the crisis showed that changes to central bank liquidity operations and broad crisis management frameworks are needed, including to address moral hazard. Changes to enhance the flexibility of central bank operational frameworks will improve the resilience of the system. Institutions and markets that are potential recipients of liquidity support in times of stress should be monitored and regulated. A continued and sustained effort to improve payment and settlement systems and crisis management coordination is also warranted.

Preserving price stability and central banks' hard-won monetary policy independence should be a key focus of reform efforts. Institutional arrangements should ensure that the role of central banks in the design and application of macroprudential measures does not impinge on their ability to deliver price stability. The policy roles of the central bank, the government, and other entities need to be clearly delineated in the wake of the broadening of the scope of their interventions during the crisis.

Central banks and other public sector entities are enhancing the role of systemic financial stability in their policy frameworks. The Fund will continue to work closely with them in these efforts, including by helping develop the needed analytical tools, filling key data gaps, and disseminating information and lessons.

I. Overview

1. **Policymakers are increasingly turning their attention to incorporating the lessons of the crisis for policy frameworks**. The crisis has shown, yet again, that an unstable financial system imposes enormous costs on the real economy, strains the public finances, and makes the achievement of price stability more difficult. Thus, a review is needed of the policies bearing on systemic financial stability, including prudential regulations and supervision, monetary policy, liquidity management, and crisis management. This paper focuses on the lessons of the crisis for the policy frameworks of central banks, although there are also implications for regulators that are separate from central banks.

2. **The crisis raises three key forward-looking questions for central banks.** First, what lessons should be drawn from the crisis—which is not yet over—for the design and operational implementation of policies focused on macro financial stability? Second, how should monetary policy strategic frameworks be modified to better prevent or ameliorate the effects of financial crises? And third, how should central bank operational and crisis management frameworks be adjusted to cope with future potential crises? These and similar questions have been tackled in earlier episodes of financial turmoil, but limited progress was made. Advanced economies are the focus of this paper because they were hit hardest by the crisis. However, this paper should be relevant for a wider range of economies.

3. **The paper draws the following broad conclusions from a review of the available evidence.** First, it suggests that financial stability should be addressed mainly using macroprudential tools, on the grounds that financial and price stability are distinct and imperfectly aligned objectives and thus need to be addressed separately. Second, price stability should remain the primary objective of monetary policy, although the monitoring and analysis of financial system developments and risks can be better integrated into policy formulation and implementation. Third, changes to liquidity and crisis management arrangements are needed to make them more flexible. Changes in these three areas should be done in a way that preserves central bank independence. The Fund will continue to work closely with central banks and others to improve the effectiveness of financial stability policies.

4. **The structure of the paper is as follows.** Section II looks back at the pre-crisis policy frameworks. Section III discusses macroprudential policies with a focus on the role of central banks. Section IV reexamines monetary policy frameworks in light of what has come before. Section V looks at complementary changes in liquidity and crisis management arrangements. Section VI briefly lays out the work agenda to improve systemic financial stability, discusses the role of the Fund and lists issues for discussion.

II. LOOKING BACK

5. **Central banks have long aimed at monetary stability whereas their financial stability roles have varied.** Monetary policy frameworks evolved as price stability was established as the main policy objective and as independence in the pursuit of this objective became enshrined in law. Central banks also played a role in safeguarding financial stability: almost all play a role in the oversight of payment systems and many are also closely involved in the supervision and regulation of the financial sector (Table 1).

What were the main tenets of monetary policy frameworks before the crisis?

6. **Over the past twenty years, almost all advanced economies and many emerging market economies central banks adopted monetary policy frameworks with price stability as the primary objective**.[2] These monetary policy frameworks often have the following features: (i) central bank independence to achieve price stability together with strong policy accountability; (ii) policy formulation based on a strategy that makes use of all available information; and (iii) an operating framework based on a single policy interest rate target implemented with market operations.

7. **The widespread adoption of this general policy framework reflects its success in contributing to a marked improvement in macroeconomic performance compared with the 1970s and 1980s**. Indeed, the period up until the financial crisis has been described as the "golden age" of central banking.[3] In addition to bringing inflation back down to levels not seen since the 1950s and early 1960s, monetary policies were also credited with contributing to an exceptionally long period of stable growth (Figure 1).

8. **Maintaining low and stable inflation was thought to be the main contribution monetary policy could make to financial stability**. Although it was not claimed that keeping inflation low would ensure financial stability, price stability and monetary policy predictability were seen as likely to reduce financial instability that might otherwise arise from monetary policy shocks.

9. **At the same time, monetary policy tended to focus less on financial system developments and vulnerabilities**. Policy objectives other than price stability—notably

[2] See Mishkin (2000), Roger and Stone (2005) and Stone and Bhundia (2004).

[3] See Gerlach and others (2009).

output or exchange rate stability—were taken into account in policy, but financial stability was often not a major consideration.[4] This reflected a number of factors:

- The conventional policy framework focused on relatively rapid channels of policy transmission to inflation and the implications of financial market vulnerabilities for the conventional policy framework were not well understood.

- A breakdown in the stability of relationships between money and credit aggregates with output and price developments within the chosen policy horizon undermined their usefulness as intermediate targets for monetary policy. The implications of the growing role of non-bank financial intermediation for the transmission of monetary policy were also not appreciated (Figure 2).

- There was a broadly accepted view that different policy instruments are needed to successfully attain different policy objectives. Interest rate policy should be used primarily to achieve the price stability objective while other instruments, notably regulation and supervision, should be used to promote financial stability.[5] Regulation and supervision were conducted almost exclusively from a micro-prudential perspective, focusing on the stability of individual institutions rather than on macro-financial linkages in the system as a whole.

10. **Despite central bank concerns with asset price movements, they have been reluctant to target them.** The appropriate response of monetary policy to asset prices was a subject of vigorous debate for several years prior to the crisis.[6] While central banks recognized potential risks associated with asset price bubbles, these were not seen, in general, as justifying monetary policy responses. It was argued that central banks did not have reliable means of identifying asset bubbles, and that, even if they could, using interest rate policy to "prick" bubbles was likely to involve high costs in terms of output foregone. A bias towards inaction was reinforced by the view that monetary policy could cushion the impact on the economy when bubbles burst. Policymakers paid little attention to the potential moral hazard

[4] On occasion, central banks (e.g., ECB and Swedish Riksbank) did take financial system developments, especially asset prices or credit growth, into account in setting interest rates, but this tended to be the exception rather than the rule.

[5] Similarly, structural reforms have been seen as the key tool for achieving full employment and higher long-run economic growth.

[6] See Cecchetti and others (2000); Bernanke and Gertler (2001); Borio and Lowe (2002); Richards and Robinson (2003); and papers presented at the 2007 Jackson Hole Symposium on *Housing, Housing Finance, and Monetary Policy*.

that such a strategy might entail—markets came to believe in a "Greenspan put"—and little thought was given to policies that could address this problem.

What did the financial stability framework look like before the crisis?

11. **A strong belief by many policymakers in the efficiency of financial markets undercut a realistic appraisal of financial stability.** Even as academic research increasingly began to question the efficient markets theory,[7] policymakers tended to ignore the implications for systemic stability of financial market imperfections, including those stemming from informational frictions, moral hazard and other distortions to incentives, such as externalities and herding.[8] Financial development and innovation were viewed as beneficial, increasing access to credit and leading to an ever more efficient allocation of risks across the system. Potential systemic risks emanating from developments such as the swelling size of the non-bank financial sector were largely left unprobed (Figure 2). Regulation and supervision were increasingly light-touch and reliant on self-correcting market forces.

12. **Considerable efforts were put into further developing international capital standards.** However, these were aimed at harmonizing the banks' own assessment of capital needs (economic capital) and regulatory requirements, rather than to mitigate systemic risks from insufficient capital. Indeed, reforms were meant to keep the level of capital in the system unchanged, and the procyclical impact of new regulations was not adequately addressed. In the meantime, international liquidity standards were lacking, and supervisors placed little emphasis on liquidity risks that could arise through more complex interactions between institutions and markets—such as risks from increased use of wholesale funding. In some jurisdictions, the effectiveness of regulation and supervision was further undermined by a rapid expansion of the non-bank financial sector and the lack of an appropriate regulatory perimeter that could have taken in the so-called "shadow banking system."[9] Central banks' role in financial stability was being reduced. In a number of countries, central banks retreated from their traditional roles in prudential regulation and supervision, as separate financial supervisory agencies were created. Instead, central banks were meant to fulfill their role in financial stability by providing an overview of risks to the financial system, often using stress tests to gauge solvency risks in recession scenarios, and promulgating results in financial

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[7] See Shiller (1981).

[8] See Brunnermeier and others (2009); Nier (2005); and Nier and Baumann (2006) for these elements.

[9] See Global Financial Stability Reports (http://www.imf.org/external/pubs/ft/gfsr/index.htm) and "On Monetary and Financial Stability—Past, Present and Future," remarks by José Viñals, Robert Marjolin Lecture at the Utrecht University School of Economics, The Netherlands, September 4, 2009 (http://www.imf.org/external/np/speeches/2009/090409a.htm).

stability reports. However, the techniques used were not sufficiently advanced to take account of the endogenous interaction between solvency and liquidity pressures, while data gaps hampered the analysis of interlinkages. Moreover, published financial stability reports often stopped short of mapping vulnerabilities to concrete policy actions.

13. **Central banks were mindful of their role as lender of last resort (LOLR).** Central banks were increasingly aware that they were ill-prepared to deal with any difficulties posed by ever larger and more interconnected financial institutions, in particular those operating across national borders. While crisis preparation was stepped up in some respects, a lack of clarity on burden sharing remained, and legal shortcomings in resolution frameworks were left unaddressed. [10]

What roles did monetary and regulatory policies play in the run-up to the crisis?

14. **Market excesses, reflecting a number of factors, and not dealt with by regulatory measures, played a major role in setting the stage for the crisis.** With inflation expectations well-anchored and inflation subdued by virtue of global supply factors, many advanced economy central banks kept policy rates low during the early 2000s in support of price stability. Low global interest rates and expectations of continued macroeconomic stability may have led market participants to underestimate risks in many asset classes.[11] At the same time, a compression of yield curve spreads, associated with the global savings glut and widening current account imbalances encouraged financial institutions to increase leverage and investors to take on greater risks. Crucially, these risks were not well-understood or forcefully addressed by regulators. In addition, monetary policymakers and regulators did not always work together closely or take a shared macroprudential view.

[10] On crisis preparations, see Manning and others (2009), pages 125–6.

[11] See Gerlach and others (2009). However, the empirical evidence on the role of low policy interest rates is mixed (Box 1).

Box 1. Was Monetary Policy to Blame for the Global Financial Crisis?

Almost three years since the onset of the global financial crisis there is still no full agreement among policymakers and researchers on what caused the global financial crisis. In particular, while supervision and regulation were clearly lacking with hindsight, disagreement persists on whether it was overly accommodative monetary policy between 2002 and 2006 that fueled the build-up (Taylor, 2007) or whether the widening trade imbalances and associated capital flows were the root cause (e.g., Bernanke, 2010, King, 2010).

The evidence on the stance of monetary policy and the housing price bubble is mixed. Taylor (2007) argued that in the United States, the demand for housing is sensitive to money-market interest rates and that accommodative policy from 2002 was likely therefore to have contributed to the build-up in housing demand and asset prices. Against this, Greenspan (2010) pointed out that U.S. house prices are more closely related to long-term rates, and the relationship between short and long rates had been weak over the period. Looking across countries, IMF (2009a) found that while in many economies, rates had been low by historical standards, there was virtually no association between measures of the monetary policy stance and house price increases across advanced economies. For example, whereas Ireland and Spain had low real short-term rates and large house price rises, Australia, New Zealand, and the United Kingdom had relatively high real rates and large house price rises.

Nonetheless, accommodative monetary policy has been argued to induce banks to take greater funding and credit risks. Adrian and Shin (2008) show that a low federal funds rate causes balance sheets of U.S investment banks to grow, as low rates reduce the cost of funding in wholesale markets.[1] And a growing number of single-country studies have analyzed whether banks take more credit risks and loosen lending standards when policy rates are low.[2] Looking across advanced countries, a forthcoming study by Merrouche and Nier (2010) finds only weak evidence that the monetary policy stances in individual countries—measured by deviations from a standard Taylor rule—affected banking sector risk-taking, as measured by the ratio of credit to deposits. There is stronger evidence though that the global monetary policy stance ahead of the crisis had an effect. Moreover, the study finds that widening trade imbalances and a compression of spreads—reductions in long-term rates relative to short rates—are likely to have contributed to the build-up of financial imbalances globally.

[1] Adrian and Shin do not find this effect to be at work for U.S. commercial banks.

[2] See Jiménez and others (2007).

How did central banks respond to the crisis?

15. **The crisis made it necessary for central banks to move decisively, and take a wide range of exceptional policy actions.** Their policy role was extended by the extraordinary degree of financial stress at the height of the crisis, other official institutions' lack (at least initially) of adequate crisis management tools, and the magnitude of the economic downturn.

16. **Most advanced economy central banks cut policy interest rates to historical lows and several committed, at least conditionally, to maintaining them at these levels for prolonged periods.** Further, major central banks took coordinated actions to loosen policy. However, financial stress continued to impede monetary policy and central banks shifted their policy focus to unconventional measures to head off the economic downturn and counter the threat of deflation.

17. **Advanced economy central banks greatly expanded systemic liquidity.** This reflected the need for them to substitute for wholesale bank and shadow bank funding markets when they dried up. All advanced economy central banks provided large amounts of liquidity and many extended the duration of fund-supplying operations and eased access to liquidity by increasing the number of counterparties and expanding eligible collateral. New facilities were established to alleviate liquidity shortfalls in specific markets that were spreading to the system as a whole and cutting off credit flows. In a few cases, liquidity provision was constrained by gaps in legal and regulatory frameworks and insufficient information. These measures seem to have been generally effective in reducing stress in funding markets (Box 2).[12]

[12] Many systemic liquidity providing measures have been rolled back (IMF, 2010b).

Box 2. Effectiveness of Crisis-Response Measures

Central bank measures to lower liquidity premia in interbank markets are generally seen to have been successful. Taylor and Williams (2008) argued that the Federal Reserve System's Term Auction Facility (TAF) was not effective since premia reflected credit rather than liquidity risk. In contrast, McAndrews and others (2008) found that the TAF decreased premiums during end-2007 to mid-2008. Reserve Bank of Australia (2009) concluded that their easing measures helped decrease the spreads of money market rates over overnight index swap rates during mid-2007 to early 2009. International Monetary Fund (2009b) also found that liquidity supports by central banks since the summer of 2007 contributed to stabilizing interbank markets in various advanced economies.

Central bank support for foreign exchange funding markets has been found to have been effective (Goldberg and others, 2010)**.** According to market participants, central bank swap facilities improved term funding conditions in major off-shore funding markets (BIS, 2010). Baba and Packer (2009) and Stone and others (2009) provide empirical evidence that U.S. dollar term funding provision by the major non-U.S. central banks as well as the Federal Reserve (Fed) commitment to provide U.S. dollar swap lines reduced foreign exchange market stress.

Several studies also suggest that central bank measures to shore up segments of money markets eased stress. Fleming and others (2010) found that the Fed operations to provide treasury securities against less liquid assets such as agency and mortgage-backed securities reduced repo rates against these securities in comparison with repo rates against treasury securities. Hirose and Ohyama (2009) concluded that market operations by the Bank of Japan stabilized commercial paper markets.

Studies of measures to reduce long-term yield curves have found some evidence for success, but the analysis is especially challenging. Oda and Kazuo (2005) reject the existence of the portfolio balance effect by the Bank of Japan's purchases of JGB during 2001-2006. Several recent empirical analyses of large-scale purchase of long-term securities found statistically significant effects of the central banks' announcement to begin or expand the purchases (Gagnon and others, 2010; Dale, 2010). However, these results must be deemed as preliminary owing to the confluence of factors influencing yields and the lack of a structural framework.

Empirical evidence on central bank commitments to keep the policy interest rate low for a long period is mixed. Evidence suggests that these were effective in Japan, (Ugai, 2006; Bernanke and others, 2004), but there is as yet little evidence with respect to the recent crisis. The work of Gagnon and others (2010) suggests that low interest rate commitments of the Fed during the recent crisis may not have been effective.

18. **A considerable amount of foreign exchange (FX) liquidity was injected into local markets.** As tensions in global funding markets surged after the collapse of Lehman, advanced economy central banks took prompt action to provide FX liquidity—mostly U.S.

dollars, but also euro, yen and Swiss franc—across borders. Foreign exchange liquidity provision was facilitated by a number of central bank swap facilities.[13] FX liquidity provision by foreign central banks had been largely wound down by end-2009 and most of swap facilities expired in the first quarter of 2010. However, as strains in U.S. dollar short-term funding markets re-emerged in Europe, five central banks reactivated the swap facilities with the Fed in May 2010.

19. **Several advanced economy central banks purchased private and public long-term securities and took other measures to shore up stressed financial markets**. The Fed purchased a large amount of private securities to support targeted credit markets, mainly commercial paper, but the amount outstanding has been decreased. Credit risks on central bank balance sheets have generally been mitigated by loss-sharing arrangements with governments. The Fed and BoE purchased large amounts of public sector securities after their policy interest rates hit the lower bound.[14] These purchases were mainly intended to lower long-term interest rates, primarily for the purchased securities, but also were aimed at improving overall credit conditions. The Fed and BoE have stopped new purchases of public securities. In May 2010, the European Central Bank (ECB) announced its intention to intervene in euro area public and private debt securities markets to address tensions in these markets. Based on this decision, euro area national central banks started purchasing government securities of selected European countries.

20. **Finally, central banks not only provided LOLR but were also intimately involved in the resolution of large systemically important institutions.** LOLR support to banks was extended by the Bank of England (BoE), while the Fed provided liquidity to systemically important non-bank financial institutions—which normally do not have access to LOLR. Further, coordination and information sharing issues, as well as the absence or inadequate scope of more formal powers to resolve individual systemically important institutions, led to a *de facto* extension of the traditional role of central banks in managing the failure of individual institutions.

What are the broad policy lessons from the crisis?

21. **The crisis is compelling hard and critical thinking about central bank policy frameworks.** On the positive side, there is a broad consensus that central banks have played

[13] These are bilateral (or in a few cases multilateral) agreements between central banks that in essence involve the provision of liquidity from a central bank whose currency was in demand to another central bank for distribution by the latter to local institutions.

[14] Purchases by the Fed of mortgage-backed securities guaranteed by government sponsored agencies are counted here as public sector securities, even though they are formally claims of the Fed on the private sector

a key role during the crisis in helping stabilize financial systems and supporting economic recovery, although more time is required for a definitive assessment. Also, to a very significant extent, central banks have maintained the credibility they earned prior to the crisis in achieving price stability, as evidenced by current indicators of inflation expectations. This is no small feat and may be especially important because central bank credibility will be needed as fiscal burdens continue to rise.

22. **But the crisis also exposed important gaps in central bank and related policy frameworks.** The frameworks for financial stability (which includes institutions other than central banks) and provision of liquidity were incomplete and in many respects not systemically oriented. In addition, the relationship between price and financial stability was not given due attention. The rest of this paper addresses the three key forward-looking questions for central bank policy frameworks noted at the outset.

III. The Role of Macroprudential Policies

23. **Primary responsibility for financial stability needs to rest with macroprudential policies.** Macroprudential tools will need to be developed and a greater emphasis given to systemic financial risks. These need to build on prudential tools that apply to individual institutions (such as capital and liquidity requirements) and contracts (e.g. loan-to-value ratios). Macroprudential tools also need to work with and be complemented by other policies, such as resolution frameworks, oversight of payment systems and security markets, and possibly monetary policy, as discussed in the next section.

What is meant by macroprudential policies?

24. **Macroprudential policies seek to ensure financial stability by mitigating the build-up of systemic risk.**[15] Systemic risk arises both from linkages within the financial system and through its interaction with the real economy across the cycle. It can be defined as the risk of serious disruption of the provision of financial services (such as credit and payment services) to the economy that results from an impairment of the financial sector.[16] To be fully effective, macroprudential policies must be applied to all systemically important institutions.

25. **A key role of macroprudential policies is to address the dynamic aspect of systemic risk—"procyclicality."** Financial imbalances tend to build up in good times, as leverage increases and financial institutions become overexposed to correlated (or aggregate)

[15] Crockett (2000).

[16] IMF/BIS/FSB (2009).

risks. One possible corrective is to redesign existing prudential tools to make them more automatically countercyclical.

26. **Macroprudential policies also seek to address the build-up of more structural vulnerabilities that contribute to systemic risk and are rooted in agency and collective action problems.**[17] One example was weaknesses in the securitization process, where misaligned incentives had contributed to a slippage in lending standards and a lack of transparency of the derivative securities. A second was insufficiently robust arrangements for the clearing and settlement of derivatives transactions as market volumes grew. A third was inadequate arrangements for the resolution of those financial institutions (Lehman, American International Group (AIG) and the government sponsored enterprises) that in the process of the build-up of financial imbalances had become too important to fail. Finally, there was a major increase in the complexity and interconnectedness of the financial system, which made the distribution of risks opaque and increased the potential for system-wide transmission of shocks.[18]

What tools can be used to counter procyclicality and how should they be applied?

27. **The procyclical build-up of financial imbalances ensues mainly from credit, liquidity, and market risks.**[19] These can build up in good times and ultimately trigger system-wide instability and losses. Prudential tools can be used to counter an excessive build-up of these risks for the economy as a whole. They can also be used to increase the resilience of the financial system should these risks crystallize, so as to maintain the provision of key financial services to the economy.[20] This can be achieved in three main ways:

- **Preventing the excessive build-up of leverage.**[21] This can involve: (i) higher minimum capital requirements at all times; (ii) additional capital buffers above the

[17] Moral hazard and adverse selection are agency problems that are endemic in financial markets. Moral hazard leads financial institutions to take too much risk, especially when there are implicit guarantees. Both moral hazard and adverse selection created weaknesses in the originate-and-distribute banking model. Insufficiently robust payment and settlement systems and lack of transparency in financial markets are rooted in collective action problems. See also Bank of England (2009).

[18] Caruana (2010).

[19] Market risk can be defined as the risk of losses on (real or financial) assets or liabilities arising from changes in market prices and covers interest-rate, foreign exchange, equity price and commodity price risk.

[20] Nier (2009), Bank of England (2009).

[21] In December 2009 the Basel Committee issued a consultation paper on a set of reform proposals to strengthen the resilience of the banking system, including through a higher quality of capital (http://www.bis.org/publ/bcbs164.htm).

minimum in good times; and (iii) forward-looking expected-loss provisioning. An example here is so-called "dynamic" provisioning, as operated in Spain since 2000.[22] Such tools can help build up better loss-absorbing buffers and prevent their erosion through dividend and bonus payments, as well as contribute to limiting the excessive expansion of credit and risk taking.

- **Limiting the build-up of liquidity risk.** This can be achieved through quantitative liquidity standards that limit reliance on volatile non-core (wholesale) funding and prevent an excessive build-up of maturity mismatches in economic upswings.[23] Such policies can also provide an additional check on excessive balance sheet expansion.[24]

- **Requiring prudent collateral policies.** The risk of a downward mean reversion of the price of collateral for credit risk mitigation can be dealt with through regulators setting minimum haircuts or margins on collateral and/or capping loan-to-value ratios, which could be tightened during booms and relaxed during downturns. The reuse ("rehypothecation") of collateral in the shadow banking system also contributed to excessive leverage.

28. **These policies limit macro-financial feedback, both in good and bad times.** First, they can reduce the build-up of imbalances in upswings and reduce the chance that aggregate levels of credit become unsustainable. Second, loss-absorbing buffers accumulated in good times can be drawn down in the downturn without impairing lending capacity. Finally, by limiting the scope for vulnerabilities to build up in the first place, these policies also reduce the likelihood that systemic feedbacks materialize in the downturn.

29. **The scope of application of countercyclical prudential tools needs to encompass all institutions that are collectively systemic**.[25] All leveraged providers of credit can become vulnerable to worsening macroeconomic conditions and their collective decisions affect the overall level of credit provided to the economy. In some jurisdictions, the appropriate scope amounts to an application of countercyclical tools to all licensed deposit

[22] Saurina (2009) and Banco de España (2009) describe dynamic provisioning in Spain. The European Commission has in 2009 started a consultation with a view to adopt dynamic provisioning across the EU.

[23] As proposed by the Basel Committee in December 2009 (http://www.bis.org/publ/bcbs165.htm.

[24] Well designed fiscal tools, such as a tax on uninsured (wholesale) liabilities, can provide additional incentives in this regard. See IMF, 2010e.

[25] See Nier (2009).

takers (banks). In others, it may also involve application to other intermediaries, such as leasing companies, credit unions, money market funds, and investment banks.[26]

30. **Further development of macroprudential tools can build on existing experience.** A study by Borio and Shim (2007) examines a number of cases in which authorities have used macroprudential measures. IMF (2010f) examines specifically the effect of prudential measures in reducing vulnerabilities stemming from capital inflows. Overall, most examples are from emerging, rather than advanced countries, with emerging Asia standing out. While limits on loan-to-value ratios and changes in reserves requirements are common tools in some of these countries, countercyclical capital buffers remain largely untested (CGFS, 2010a). In some cases, the measures appear to have slowed credit growth. In others, they seem to have helped the banking sector withstand the unwinding of imbalances. Moreover, the experience suggests that effectiveness is often enhanced by introducing a range of measures, rather than a single tool.

31. **Considerable work remains to operationalize new systemically oriented tools.** Some tools will need to be phased in gradually so as to ensure that their introduction does not itself lead to an unintended disruption of the level of financial services provided to the economy. They may also need to be recalibrated periodically, to make sure that they remain effective in countering the build-up of financial imbalances. Potential gaps in coverage will need to be closed, as the financial system adapts and leveraged provision of credit moves outside of the banking system. Expectations about the functioning of the tools will need to be managed through careful communication.**The macroprudential framework must be based on robust rules together with judgment when rules are not sufficient:**

- Rules for the countercyclical adjustment of provisions (e.g., dynamic provisioning) and capital buffers (as in capital conservation rules proposed by the Basel Committee) have clear advantages over discretion. They increase the predictability of regulatory action for market participants and can reduce the burden of adjustment on the financial sector. Given risk measurement difficulties, a pre-committed rule can overcome the bias for inaction that would tend to prevail if each discretionary action needed to be justified in the face of large measurement uncertainty, potentially strong market resistance, and other political economy constraints.

- However, the complexity of financial markets, *ex ante* risk measurement difficulties, and uncertainty over the impact of macroprudential tools may limit policymakers'

[26] Bank-sponsored conduits and special purpose vehicles that take on credit off-balance sheet may also need to be included but could more appropriately be consolidated on the sponsoring bank's balance sheet.

ability to design a fully robust rule.[27] Therefore, rules may need to be complemented by a framework of regulatory and supervisory judgment. Such a framework needs to provide room for maneuver, so that tools can be adjusted on the basis of accumulated experience and used flexibly and in a more granular way, for example, to address specific risks that may build up in particular sectors.[28] Discretionary supervisory action needs to be based on a clear communication of these risks. Ensuring policymakers have the "will to act" is the main challenge for the effectiveness of any type of discretionary overlay, and in some countries will require substantial changes in the institutional and legal framework of supervision.

32. **Macroprudential policy needs to flow from a clear mandate with strong governance and accountability.** Policy actions need to be grounded in a mandate that sets out both the objective and the degree of discretion afforded to policymakers in the clearest possible terms. The policy framework needs to be further buttressed by strong governance and independent accountability, so as to ensure that policymakers do not shy away from "taking away the punch bowl" when this is necessary. Strong governance can also enhance transparency and predictability of actions taken.

What is the role for central banks in the macroprudential framework?

33. **Central banks can bring expertise and information as well as strong incentives to increase the effectiveness of macroprudential policies.**[29] Central bank expertise in the analysis of systemic risk and macro-financial linkages is useful in calibrating macroprudential policies. Central banks are likely also to take a strong interest in the design and effective application of macroprudential tools, whether or not they are directly responsible for them. This is so for a number of reasons:

- Ineffective macroprudential tools increase the burden on monetary policy to reduce the build-up of financial imbalances in normal times. The less effective prudential tools are, the greater the burden on monetary policy to maintain financial stability, which can lead to widening output gaps and greater volatility of inflation.

- Ineffective macroprudential tools also increase the likelihood that central banks have to provide emergency liquidity to deal with systemic stresses, which can potentially impair their balance sheet and complicate the conduct of monetary policy.

[27] See Viñals and Fiechter (2010).

[28] Bank of England (2009).

[29] Nier (2009).

- The application of macroprudential tools is likely to affect the transmission of monetary policy both in normal times and in times of stress. For example, unusually low (or high) interest rates will have a different effect on the provision of credit depending on the state of countercyclical buffers.

34. **Much work remains on developing institutional arrangements in support of macroprudential policies including to ensure monetary policy independence.**[30] This poses different challenges for different existing institutional structures:

- Where both monetary policy and prudential policies are conducted by the central bank, separate governance arrangements are needed to ensure monetary policy independence. Macroprudential policies could be overseen by a dedicated and independent committee. For example, current U.S. reform proposals envisage the creation of a "Financial Services Oversight Committee" to provide governance for actions taken by the Fed and other regulators in pursuit of financial stability. A strengthening of the governance arrangements for monetary policy—e.g., introducing greater formal independence or delegating policy to a monetary policy committee—can also safeguard against a loss of monetary policy independence.

- Where monetary policy is institutionally separate from prudential regulation or supervision, strong governance of prudential action is equally important. The institutional arrangements need to ensure that the central bank works with and has an appropriate degree of influence over macroprudential policies conducted by other agencies, to foster consistency with monetary policy objectives. For example, the central bank as an institution or central bank officials could be given a strong voice on a systemic risk "council" that provides governance for actions taken by regulatory or supervisory agencies (Box 3).[31]

[30] Trichet (2010).

[31] The proposed arrangements in the European Union, where central bank officials are given a strong voice on the European Systemic Risk Board, is an example. Alternatively, the central bank could be given the role of writing regular "letters" to the supervisory authority, setting out its recommendations for macroprudential policies (as suggested by Turner, 2009).

Box 3. Changes to Institutional Arrangements for Financial Stability

National financial stability frameworks and the place of central banks within these are heterogeneous (Table 1). In part, this reflects differences in traditions and the state of the financial system. But this also reflects policy decisions to roll back the role of central banks in regulation and supervision in favor of the establishment of single integrated regulators (such as the UK's Financial Service Authority)[1] that combined all supervision and regulation across sectors (banking, insurance and securities) outside of the central bank. In these cases, the framework typically assigns to the central bank three financial stability functions: (i) overview of financial stability risks; (ii) lender of last resort lending; and (iii) oversight of payment and settlement systems.[2] In a number of other countries (Argentina, Brazil, France, Italy, South Africa) the central bank regulates and supervises banks, or shares this role with a number of other sectoral regulators (e.g., United States) or the integrated regulator (e.g., Germany).

The crisis is leading to a review of financial stability frameworks including the role of the central bank. The impetus for reform appears strongest in those advanced countries most hit by the crisis and where existing structures appeared fragmented (e.g., in the United States and European Union), contributing to uneven levels of supervision and complicating crisis management. At the margin, there appears to be some momentum to strengthen the role of central banks, by entrusting them with a greater role in prudential regulation and supervision (Germany, France, United Kingdom), a formal role in resolution (United Kingdom) and a role in issuing macroprudential risk warnings (EU, through the European Systemic Risk Board). A number of countries also plan or have already introduced new systemic risk "councils" (e.g., France, Germany, Italy, Mexico, United States) to strengthen interagency coordination and governance, so as to more effectively identify and address emerging systemic risks across the financial system. Precursors to such councils include the Council of Financial Regulators of Australia and the United Kingdom's Tripartite Standing Committee.

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[1] The single integrated regulator model was adopted mainly by more advanced economies, including Norway (1985); Canada (1987); Denmark (1988); Sweden (1991); Switzerland (1993); U.K. (1997); Luxembourg (1999); Korea (1999); Mexico (1999); Iceland (1999); Japan (2000); Hungary (2000); Latvia (2001); Austria (2002); Estonia (2002); Germany (2002); Finland (2003); UAE (2003); Belgium (2004); and Poland (2008). In some of these economies the integrated regulator only covers two out of the three sectors (banking, insurance, and securities).

[2] Nier (2009) provides further analysis of the single-integrated regulator and twin-peaks models.

35. **Technical cooperation between prudential and monetary policy functions needs to be ensured, regardless of the precise institutional arrangements, which will differ**

across countries and may shift with time.[32] The design and monitoring of macroprudential policies will benefit from the use of both micro- and system-level data, such as indicators of developments in aggregate credit and capital flows. Supervisory data may also provide useful information for the conduct of monetary policy and should be made accessible for this purpose. Looking ahead, both monetary and macro-prudential policies stand to benefit from advances in macroeconomic models that improve our understanding of macro-financial linkages, including the interaction between monetary and prudential policies, as discussed in the next section.

36. **Globally and regionally coordinated approaches have clear benefits.** While macroprudential tools can be introduced and calibrated unilaterally, such action may lead to arbitrage and distort the flow of capital across borders, in turn reducing the effectiveness of prudential measures. On the other hand, negotiations in international fora may not always progress at a speed sufficient to allow a continued reappraisal of macroprudential policies. The need to negotiate standards that satisfy all countries may also lead to policy outcomes that are less effective than would be desirable. In some cases, the solution may be for global standards to provide general guidance, leaving room for differences in policy implementation at the regional and national level.

37. **Today, authorities are still in the early stages of articulating a policy framework for financial stability.**[33] A prerequisite for progress is agreement on systemic financial stability as the key policy objective. Intermediate policy "targets," such as the appropriate degree of resilience to credit, liquidity and market risks will also need to be agreed upon. The monitoring and analysis of financial stability indicators and macro-financial linkages will need to be broadened and deepened and communication of risks refined. Much work remains to be done to develop and operationalize tools. Accountability mechanisms—such as systemic risk councils and financial stability committees—will have to be established. The globalization of the provision of financial services requires a high degree of international coordination and cooperation.

IV. MONETARY POLICY FRAMEWORKS

38. **Monetary policy should continue to focus on price stability as its primary responsibility.** The crisis has not overturned the widely accepted assessments that underpin

[32] Arrangements are often deeply rooted in tradition, but may need to be adjusted to reflect developments in the financial sector. Nier (2009) provides further discussion of the appropriate place of central banks in the overall institutional framework, including not only banking supervision but also securities market regulation.

[33] Development of a more complete financial stability framework may parallel in some respects the development of the monetary policy frameworks employed by advanced economy central banks today (Madigan, 1994 and Roger and Stone, 2005).

standard monetary policy frameworks. These are that inflation has high costs; that there is no exploitable long-run tradeoff between inflation and growth; and that a strong track record, strengthened by central bank independence and policy accountability, increases the effectiveness of monetary policy.[34] Moreover, price stability and monetary policy help ensure financial stability, especially when supported by effective financial stability policies.

39. **In practice, price stability has typically meant an average inflation rate of about two percent, although definitions vary across countries.** In normal economic times, price stability provides sufficient room for interest rate policy to react to short-run variations in economic activity. On rare occasions, a severe crisis may cause policy interest rates to reach the zero lower bound. However, such severe crises usually stem from conditions that also make interest rates relatively ineffective in stimulating aggregate demand, while increases in risk aversion may well override the stimulus to consumption and investment of low real interest rates.[35] In such circumstances, unconventional measures, such as those used in the recent crisis, will be more effective (Box 2).

40. **There is scope for monetary policy to pay greater attention to financial developments and risks.** At times, monetary policy may need to take account of financial stability, for example when macroprudential policies are not fully effective, or to facilitate monetary transmission. However, the policy interest rate is a very blunt instrument, best geared to influencing the overall state of economic activity, and unsuited to addressing particular vulnerabilities in the financial sector. Thus, vigorous use of monetary policy to pursue financial stability would almost certainly conflict with the primary objective of maintaining price stability, and could result in greater volatility in real activity.

What can monetary policy do to promote financial stability?

41. **Even with price stability as the primary objective of monetary policy, financial system developments and vulnerabilities need to be more fully taken into account.** A key priority is to strengthen central banks' monitoring and analysis of financial imbalances and risks. Kohn (2009) and many others have noted that standard macroeconomic models used for monetary policy largely ignore financial balance sheets, financial intermediation, and asset prices. Incorporating such features into coherent macroeconomic models, however, is a non-trivial task, and currently only a few central banks have built models with explicit financial sectors (Box 4). Nonetheless, movement in this direction is essential for monetary

[34] See Mishkin (2007).

[35] IMF (2009a).

policy makers to assess the consistency of financial sector developments with price and output stability.

Box 4. Financial Intermediation in Central Bank Core Models[1]

Most models used by central banks for forecasting and policy analysis do not include explicit representations of key channels in the financial intermediation process. Financial intermediation is ignored in models that assume perfect and complete financial markets.[2] The core forecasting models of central banks typically include only a very limited set of assets (usually government bonds and productive capital) and no explicit representation of borrowing and lending between private agents. Most advanced economy central banks, including the Fed, ECB, Bank of Canada (BoC), and Reserve Bank of New Zealand did not include credit channels in their models prior to the recent crisis. However, some, including the ECB and Bank of Canada, were developing models including financial frictions and explicit financial sectors. Others, including the Bank of England and the Bank of Japan, have included financial wealth effects in their models providing a channel for asset values to affect spending. Recently, many central banks, including the ECB and the Fed, have begun to focus a considerable part of their research efforts on macro-financial linkages.

Balance sheet and credit channels linking the availability of loans to households or firms to their holdings of collateral or net worth are generally missing. These channels, arising from financial market imperfections, are considered as crucial for capturing procyclicality in financial intermediation. For example, strong demand boosts housing values, which provides collateral for higher household borrowing. For firms, a cyclical upswing tends to boost profitability, increasing creditworthiness. This lowers bank lending spreads, encouraging corporate borrowing and increasing investment spending.

Central banks are beginning to incorporate such features into macroeconomic models. A few central banks such as the ECB, Fed, Swedish Riksbank, and Reserve Bank of New Zealand have introduced these aspects into forecasting models. Others, including the Bank of France, Bank of Canada, and Bank of Italy have begun to incorporate these features into "satellite" models which are not yet fully integrated into the main forecasting exercise.

Substantial further work is needed. Even in the relatively advanced models being developed, important features of financial systems are not fully incorporated, such as endogenous determination of loan defaults, or interbank markets, and contagion effects. Many models have difficulty replicating or explaining important empirical regularities of financial data, such as the cyclical properties of interest rate spreads.

[1/] This box is based on publicly available papers describing the core forecasting models of central banks.

[2/] The financial sector is characterized as perfect when it is frictionless and fully competitive. Completeness refers to a financial system with instruments to manage all risks.

42. **A lengthening of the monetary policy horizon has been proposed to help address financial stability concerns.** The financial and asset price imbalances that tend to magnify

risks to financial stability tend to develop gradually, and therefore generally lie beyond the conventional planning horizon for monetary policy of under about three years. Consequently, it is argued that central banks may need to adopt longer planning horizons to bring financial stability concerns into their decision making.[36] [37] Responding to financial imbalances, at least if they are not fully consistent with price stability, also implies that deviations of inflation from target are likely to be larger and more prolonged than otherwise. From this perspective consideration might also need to be given to widening target ranges. However, careful attention needs to be paid to the impact on credibility and accountability of bringing financial stability considerations into the policy framework in these ways. A particular concern in this context is that tolerating more persistent deviations of inflation would both dilute policy accountability and fuel uncertainty about the long-term commitment to price stability.

43. **An open question is whether monetary policy should go beyond these measures and add financial stability as a distinct policy objective.** Strengthening understanding and monitoring of macro-financial interactions and lengthening the monetary policy horizon do not imply adding a financial stability objective to the central bank's other objectives. What they do imply is that the central bank could more fully take financial stability developments into consideration to the extent that they were consistent with the primary policy objective of price stability.[38] A much bigger step would be to add a financial stability objective to the central bank's monetary policy mandate. In this case, financial stability considerations would need to be taken into account in monetary policy whether or not they were consistent with the price stability objective. Assigning only one policy instrument—the policy interest rate—to more than one objective would confront monetary policy with sharp trade-offs and could well lead to a failure to achieve either objective.[39]

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[36] See Borio and White (2004), and Gerlach and others (2009).

[37] Lengthening policy horizons could add an element of price level targeting to the policy framework [(Walsh (2009), Carney (2009)]. Price level targeting requires that the cumulative effects on the price level of deviations from the inflation target eventually be reversed in order to achieve the desired long-run inflation objective. This approach might help strengthen policy accountability while at the same time facilitating increased policy flexibility in the short and medium term. However, price level targeting poses a number of practical difficulties (Kohn, 2009).

[38] This is closely analogous to the way that many inflation targeting central banks deal with exchange rate developments. Although the central bank does not have any exchange rate objective per se, exchange rate developments are monitored and analyzed carefully in so far as they affect the outlook for inflation and output.

[39] See Bini-Smaghi (2010).

44. **The longstanding debate on whether central banks should "lean against" emerging financial imbalances or "bubbles" by raising policy interest rates has been reopened by the crisis.**[40] A common view has been that leaning mechanistically against financial imbalances could increase inflation volatility,[41] require strong interest rate responses to be effective and thus impose high output costs,[42] and may be counterproductive in small open economies where high interest rates can attract capital inflows.[43] Nevertheless, the high costs of systemic financial instability shown by the crisis can be seen as strengthening the case for using monetary policy to lean against asset price bubbles. Until financial developments are better structurally incorporated in monetary policy decision making, central banks should best utilize judgment in deciding whether to maintain interest rates somewhat higher than otherwise in order to avoid imbalances from undermining financial stability, which would ultimately endanger price stability. For example, the combination of rising asset prices and rapid credit growth may warrant a higher policy rate.

45. **More work is needed on how monetary policy can deal with potential conflicts in attaining both financial stability and price stability.** In crisis times, a monetary easing helps counter the risk of deflation and at the same time contributes to stabilizing the financial sector and facilitating monetary transmission. In contrast, monetary tightening to address emerging financial imbalances may lead to wider output gaps and more volatile inflation, creating a potential conflict. But when monetary policy does not lean vigorously against the build-up of financial imbalances, the resulting asymmetry may create moral hazard and encourage the build-up of financial imbalances. However, formal studies suggest that this inherent time-inconsistency in monetary policy cannot credibly be addressed by monetary policy itself, but instead requires a prudential response.[44] Rather than trying to reduce imbalances using interest rate policy, it may therefore be preferable in many cases for central banks to step up communication and issue risk warnings, that need to be backed up by the 'threat' of macroprudential action.

[40] See Bernanke and Gertler (2000), and Richards and Robinson (2003).

[41] See Gerlach and others (2009).

[42] See Bank of England (2009).

[43] See Ostry and others (2010).

[44] See Farhi and Tirole (2009).

What has been learned about the use of unconventional monetary policy tools?[45]

46. **The experience so far suggests some elements of good practice:**

- Policy objective—The overarching objective of the tool—whether in support of price stability or financial stability, or both—should be set out clearly at the outset to facilitate understanding of the measure and minimize the possibility of overlap across policy areas, including between monetary and fiscal policies. This will help to stabilize expectations.

- Transmission—Communication of the transmission of unconventional measures enhances understanding of how the policy is to work and can help to underpin its effectiveness.

- Transparency—A clear initial explanation, regular updates including of balance sheet data, and formulation of an exit strategy enhance effectiveness and accountability.

- Balance sheet protection—Risks taken on by the central bank should be managed appropriately. Any credit risk should be transferred to the government because credit policy is a fiscal area.

47. **Adherence to these practices would help preserve the high degree of central bank independence that has proven crucial for maintaining price stability.** Quasi-fiscal roles taken on by central banks in the past undermined their credibility (Fry, 1993 and Mackenzie and Stella, 1996). Today, any pressures to entrench the expanded policy role that central banks took on during the crisis and that are normally outside of their mandate should thus be resisted. Any losses from long-term security holdings that threaten the financial integrity of central banks should be met by government financing. The expanded post-crisis balance sheets make even more important effective collaboration between the central bank and government in macro-policy coordination, cash management, and broader asset and liquidity management.

V. Liquidity Management and Crisis Frameworks

48. **The crisis exposed weaknesses in central bank liquidity management and in national and international crisis management frameworks.** The greatly expanded operations of central banks during the crisis blurred operational targets, complicated communication, and exposed them to new risks. Gaps in crisis management frameworks led

[45] These issues are addressed in IMF (2010a).

in a few cases to the prolonged involvement of central banks in unfamiliar areas. Further, these measures contributed to moral hazard by raising market expectations of large liquidity injections (and other public support) in times of stress. These weaknesses have created an awareness of the need for more flexible, formal, and better coordinated arrangements.

How should the operational frameworks of central banks be altered?

49. **Core elements of pre-crisis operational frameworks should be retained.** The market-based single short-term policy interest rate approach helped establish and entrench price stability before the crisis. For many advanced economy central banks, the operational framework is complemented by standing lending and borrowing facilities that establish a corridor around the policy rate, and remunerated and/or required reserves. Variants of this framework are used by all major advanced economy central banks and most elements should be retained.

50. **However, more flexible operational frameworks would enhance the resiliency of the system.** Before the crisis, most central banks conducted monetary operations through narrow channels, with the expectation that funds would be redistributed to the institutions and markets most in need of funding (Box 5). During the crisis, some aspects of liquidity provision proved to be too rigid to address problems in specific markets and institutions that caused systemic stress. Thus, consideration can be given to broadening liquidity management frameworks to increase the crisis options available to central banks.[46]

- *Higher reserve levels*—Central banks typically vary their liquidity provision to match reserve demand and thus stabilize market interest rates. Before the crisis, reserve levels were in some cases very small in relation to funding volumes. Larger equilibrium levels of reserves could help to better absorb liquidity shocks and thereby enhance policy flexibility and systemic resiliency.[47] Larger reserve levels could also be useful in economies with more complicated financial structures, where stresses can rapidly increase the volatility of reserve demand.[48]

[46] See CGFS (2008) and Chailloux and others (2008) for discussions of changes in operational frameworks central banks made during the crisis and refinements of liquidity management operations.

[47] In principle, higher reserves may interact with more stringent liquidity requirements for banking institutions. However, they need not conflict when they count towards prudential liquid assets.

[48] Reserve levels could be boosted by raising reserve requirements. Alternatively, under a voluntary reserve targeting scheme such as that adopted by the Bank of England in 2006, institutions can choose to raise their own targets in response to stresses.

- *Maintain a sufficient set of counterparties for flexible liquidity provision*—Financial innovation has made funding linkages stronger and more fluid than before. Central banks should thus be able to provide liquidity to a sufficiently wide range of players in systemically important funding markets under different market conditions. In doing so, central banks must be able to ensure the solvency of their counterparties.

- *Maintain sufficient and properly priced eligible collateral*—High-quality securities not already on central bank collateral lists should be added to facilitate liquidity management. If available high-quality securities are small in relation to funding needs, lower-quality securities could become eligible when needed, but with careful attention to proper pricing and adequate monitoring to reflect credit and liquidity risks. Importantly, appropriate haircuts should be applied so as to minimize financial risks to central banks. Other measures such as differentiating interest rates on credits depending on the type of collateral and margin adjustments can also be used.

- *Reduce stigma*—Liquidity access can be designed to reduce stigma (a bank being unwilling to borrow from the central bank owing to its concern that by doing so it would send a signal to the markets that it was uncreditworthy) that can impede liquidity provision. Stigma surrounding the use of standing lending facilities can be reduced by reinforcing anonymity or by introducing new tools for liquidity backstopping.

- *Effective funds-absorbing tools*—A wide array of liquidity absorbing tools, such as central bank bills and an ability to remunerate central bank deposits, can enhance liquidity management during normal conditions and be used to absorb large-scale liquidity injections.

Some of these changes, such as expanded collateral and a wider range of counterparties, might be used only sparingly in normal circumstances, mainly as a means to prepare for a possible scaling up of operations during periods of turbulence.

Box 5. Collateral and Counterparty Arrangements

Many advanced economy central banks expanded eligible collateral during the crisis. This was the case for central banks which had conducted open market operations (OMO) before the crisis using narrow or wide criteria for collateral eligibility.

Eligible Asset Classes of Selected Central Banks[1/]

	Public securities[3/]		Private assets			
	Domestic currency	Foreign currency	Corporate bond	ABS [4/]	Short-term bank debt	Bank Loans
Fed						
OMO [2/]	eligible	added	added	added	added	added
Standing facility	eligible	eligible	eligible	eligible	eligible	eligible
ECB	eligible	added	expanded	eligible	expanded	eligible
BoE	eligible	expanded	added	added	not eligible	not eligible
BoJ	expanded	added	expanded	expanded	not eligible	expanded
BoC						
OMO	expanded	added	added	not eligible	added	added
Standing facility	eligible	added	eligible	not eligible	eligible	added
RBA	eligible	not eligible	added	added	expanded	not eligible

1/ "Eligible" indicates that the asset class has been eligible since the pre-crisis and no change has been made. "Added" indicates that the asset class had not been eligible before the crisis but was made eligible during the crisis. "Expanded" indicates that the asset class has been eligible since the pre-crisis and the eligible type of security was expanded during the crisis. "Not eligible" indicates that the asset class has continued to be ineligible through the crisis period.
2/ The term auction facility of the Fed is included in OMOs as its profile is close to OMOs of other central banks such as the ECB and BoJ.
3/ Public securities are bonds issued or guaranteed by central or local governments or government agencies.
4/ Asset backed commercial paper was made eligible by the BoC.

Changes in counterparty arrangements during the crisis reflected the pre-crisis regime. Central banks that had conducted OMOs with a small number of primary dealers increased their counterparties. In contrast, central banks that had conducted OMOs against a broader range of counterparties made limited or no changes.

Counterparty Pools of Selected Central Banks[1/]

	OMO	Standing facility
Fed	Primary dealers	Deposit institutions
ECB	Credit institutions	Credit institutions
BoE	Banks, building societies, and securities dealers	Banks and building societies
BoJ	Financial institutions including banks, securities dealers, and money brokers	Financial institutions including banks, securities dealers, and money brokers
BoC	Primary dealers	Direct participants of the large-value payment system
RBA	Members of the large-value payment system	RBA's Exchange Settlement account holders

1/ Eligibility of each individual institution can be subject to additional standards related to credit quality, status in reserve requirement systems, and presence in funding markets.

As market conditions have recovered, some but not all of the changes have been unwound. While the Fed and Bank of Canada have been restoring the pre-crisis arrangements for OMO counterparties and collateral, the Reserve Bank of Australia maintains the extended collateral framework. The Bank of Japan also maintains an expanded collateral list for government bonds, though it has been terminating the active use of private instruments. Meanwhile, the Bank of England has proposed a wider range of collateral to provide liquidity insurance to the banking system.

What are the lessons for the provision of liquidity to markets and institutions in times of crisis?

51. **During the crisis, central banks widened the scope of liquidity support to address stresses in systemically important markets.** While this was needed to help maintain the flow of credit to the economy and restore market confidence, it also raised questions about the role of central banks including potential moral hazard. These concerns could be addressed by ensuring that central banks have the information and tools on an ongoing basis to be able to identify systemic vulnerabilities, which will require continuous monitoring and cooperation with regulators and supervisors.[49] Central bank intervention should be undertaken only when other measures are not available and be designed to be attractive only under exceptional market circumstances. Further, a sustained effort needed to support a particular market should be handled by the government as this is a fiscal task.

52. **The crisis also demonstrated that central banks' longstanding role in supporting systemically important institutions was not as clearly articulated as previously thought.** Again, central banks should have all available information immediately at hand to judge whether a bank or other financial institution is systemically important as well as solvent. While solvency may be difficult to ascertain in a period of turbulence, the quality of these judgments can be improved by closer coordination and information sharing with the potential counterparties themselves, supervisors, and other central banks. Legal frameworks should provide enough leeway for central banks to provide liquidity to systemically important counterparties, using a broad range of instruments.

53. **Broader changes to the financial stability framework are needed to avoid the moral hazard arising from the crisis experience.** First, *all* institutions (not just deposit-takers) and markets that could potentially need liquidity support in a crisis should be appropriately regulated and supervised, and explicit liquidity standards be applied to, at a minimum, institutions that maintain reserves at the central bank.[50] Second, more formal frameworks are needed for a rapid resolution of insolvent financial institutions.[51] The scope of such resolution tools again needs to include all potentially systemic institutions and ensure that shareholders and management have the proper incentives to avoid undue risks.

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[49] Systemic vulnerability can be addressed by measures to increase the transparency of market and measures to ensure that market participants have proper incentives. For example, originators and sponsors of asset-backed securities may need to be required to retain an appropriate amount of "skin in the game."

[50] See IMF/BIS/FSB (2009) for a discussion of this boundary.

[51] See Cihak and Nier (2009). Current reform proposals for the United States envisage all systemically important financial holding companies to be subject to special resolution powers.

54. **The crisis also underscored the importance of robust payment and settlement systems.** The crisis would have been much more severe had central banks not taken efforts to introduce robust payment and settlement systems, including for foreign exchange, over the two decades ahead of the crisis.[52] However, stress did emerge in the clearing and settlement of derivatives transactions, where market volumes had grown rapidly ahead of the crisis. The systemic impact of failure of a financial institution depends critically on the robustness of the infrastructure underpinning those markets in which it is active. AIG, for example, would have posed a much lower systemic concern had the derivatives it offered been centrally cleared. A continuous and sustained effort is thus needed to ensure that the infrastructure keeps up with the development of financial markets.[53] Central banks, which in many cases are engaged in oversight of these systems, should play an important role in this regard, in cooperation with securities regulators and supervisors of individual institutions.[54]

55. **Crisis management coordination could also be stepped up.** Ongoing changes in the financial sector constantly shift risks within the system. Thus, the crisis management capacity of central banks, together with other entities, must keep pace. Regular crisis simulation "war games" help to facilitate crisis management. The establishment of more formal crisis management groups for cross-border institutions—as envisaged by the Financial Stability Board—will also help increase crisis preparedness, including as regards burden sharing.

What role should central banks play in cross-border liquidity shortages?

56. **Central banks have an important role to play in preventing systemic stress arising from the disruption of cross-border foreign exchange funding.** The crisis showed that the disruption of cross-border funding linkages can have large and unforeseen consequences (CGFS, 2010b). The swap arrangements between central banks during the crisis were effective in countering global shortages of key funding currencies and central banks should be prepared to use them again if necessary.[55] Central banks should be able to establish these arrangements on a timely basis if and when they are needed. In this

[52] Manning and others (2009).

[53] Since 2005, there has also been an effort on the part of central banks, led by the Federal Reserve Bank of New York, and industry participants to reduce counterparty credit risk in bilaterally cleared "over-the-counter" derivatives markets, most notably markets for credit default swaps.

[54] See Manning and others (2009) and IMF (2010c).

[55] The efficacy of central bank swap arrangements need to be considered together with other foreign exchange liquidity providing options such as regional pooling arrangements, cross-border collateralization arrangements, self-insurance through foreign reserves, and the Fund's Flexible Credit Line; consideration of these options is beyond the scope of this paper.

connection, a high priority should be given to facilitating information sharing among central banks on foreign exchange exposure in off-shore markets. Central banks should have access to information on the liquidity positions of institutions (including off balance sheet) and markets that could pose systemic risks.

57. **Central bank swap arrangements should be designed to avoid moral hazard and losses for central banks.** First, central banks should work closely with regulators to ensure that market participants are internalizing any systemic risks posed by their foreign exchange liquidity management, especially with respect to funding as well as currency and duration mismatches. Monitoring and supervision of local counterparties is needed to avoid credit risk being taken on by the liquidity receiving central bank.[56] Second, moral hazard can be mitigated with appropriate arrangements such as setting an explicit termination date or pricing the transactions so that access is attractive only under stressed conditions. Third, swaps are best suited for alleviating stress in local foreign exchange markets arising from temporary shortages in global liquidity. Central bank swap arrangements to provide liquidity to countries with deteriorating balance of payment conditions, or provided over somewhat longer horizons, should only be undertaken if there is adequate assurance that supporting macroeconomic and financial sector policies are being implemented.

VI. LOOKING AHEAD

58. **Revising policy frameworks to take greater account of systemic financial stability poses an array of challenges to central banks and other public sector entities.** The experience of the crisis showed that a comprehensive financial stability framework was lacking and that much work is needed to fill this gap. Changes to monetary policy and crisis and liquidity management frameworks are also needed, as well as further work on the interactions between monetary, macroprudential, liquidity and crisis management policies. The work at the national level must be closely integrated with the ongoing changes in regulatory and supervisory standards and practices. The agenda is not just for the advanced economies that were at the center of the crisis, but is also for other advanced and emerging market economies.

59. **The Fund will continue to work closely with central banks and others to improve the effectiveness of financial stability policies.** The Fund is well placed to engage with standard setters, the Financial Stability Board, the Bank of International Settlements, and other institutions, as well as to serve as an interlocutor for views of central banks. The Fund will also continue to develop and refine FSAPs, where traditionally the central bank has been

[56] The liquidity providing central bank is not directly exposed to credit risks of local counterparties of the liquidity receiving central bank.

a main counterpart.[57] Efforts here include more modular FSAPs targeted at the relevant country-specific sources of systemic financial stress. The Fund will continue to provide technical assistance to develop the institutional and analytical elements of financial stability frameworks.

60. **The Fund is helping to further develop the needed analytical tools and fill data gaps.** A number of projects are underway aimed at better understanding the role of macro-financial linkages in the macroeconomic models used by central banks. The Fund also has a number of initiatives in train to help enhance the availability of data needed for central banks and other policymakers for analysis of systemic risks.

Issues for Discussion

- Do Directors agree that macroprudential policies should be the main policy tool to maintain systemic financial stability, while monetary policy can be formulated to address systemic financial risks when this is consistent with price stability?

- Do Directors agree that price stability should remain the primary goal of monetary policy, and that any changes to strategic policy frameworks should not undermine commitment to this goal?

- Do Directors agree that a lesson for monetary policy makers is to better integrate the monitoring and analysis of financial system developments and risks into the formulation and implementation of policy?

- Do Directors agree that macro-financial linkages in the analytical tools used by central banks for monetary policy need to be developed to account for systemic financial stability considerations? Likewise, do Directors agree that much work remains to be done to develop macroprudential indicators? Do Directors agree that these are important areas for the Fund?

- Do Directors agree that dialogue and cooperation between macroprudential and monetary policy functions need to be enhanced and clear transparency and accountability modalities developed?

- Do Directors agree that liquidity and crisis management frameworks should be refined to enhance flexibility to deal with episodes of stress?

[57] See IMF (2010d).

- Do Directors agree that the policy roles of central bank, government and other entities need to be clearly delineated and the financial position of central banks protected to ensure central bank independence and their ability to deliver price stability?

- Do Directors concur with the array of challenges to central banks and other public sector entities posed by formulating and putting into place the post-crisis systemic stability policy framework? Do Directors agree that the Fund should step up its efforts to improve the effectiveness of financial stability frameworks?

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Table 1. The Role of G20 Central Banks in Financial Stability

(As of end-September 2009)

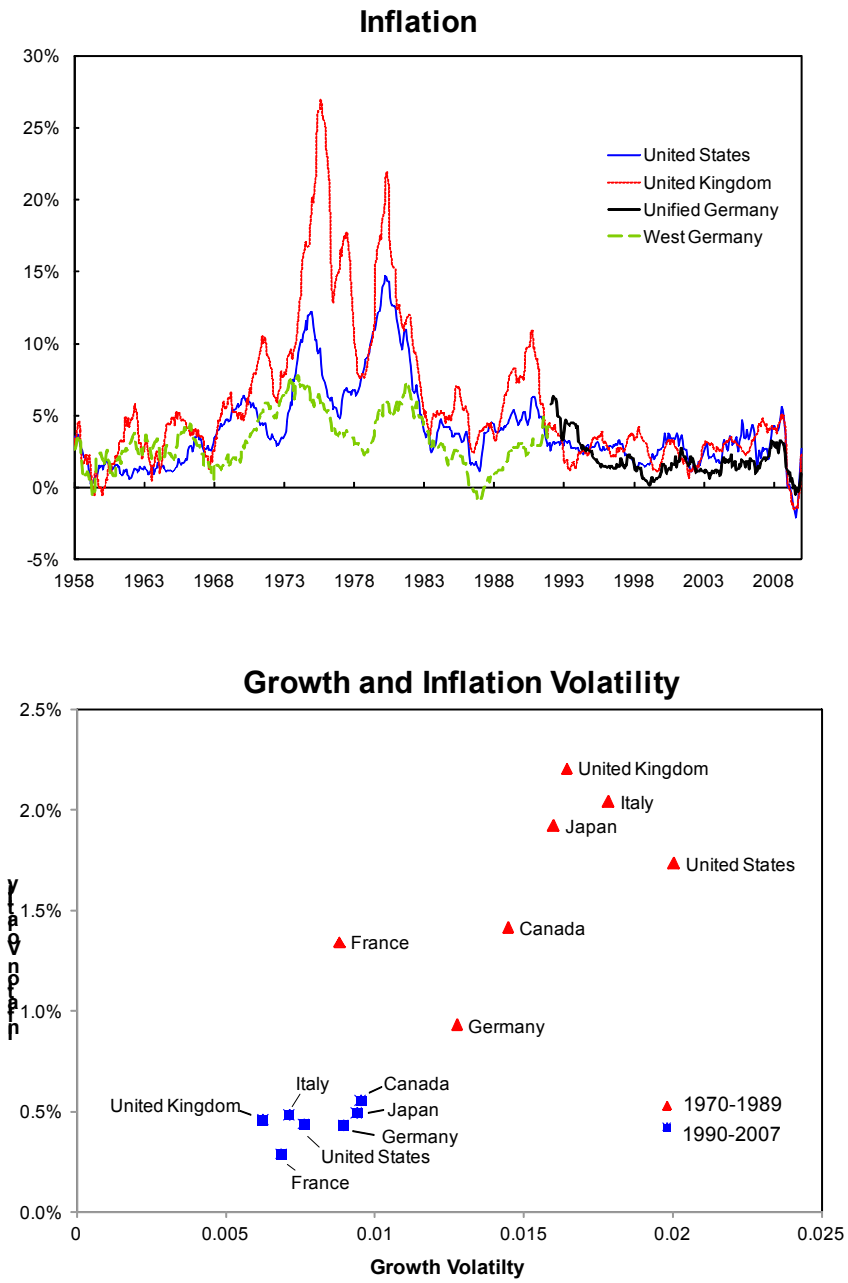
	Law explicitly states financial stability as a central bank's objective or task [1/]	The central bank's function in financial stability [2/]		Financial stability report
		Regulation	Supervision	
Argentina	√	√	√	√
Australia				√
Brazil	√	√	√	√
Canada	√			√
China	√		<√>	√
ECB	√			√
France	√	√	√	√
Germany	√	<√>	<√>	√
India		√	√	√
Indonesia	√	√	√	√
Italy	√	√	√	
Japan	√		*	√
Korea			*	√
Mexico	√			√
Russia	√	√	√	√
Saudi Arabia	√	√	√	
South Africa	√	√	√	√
Turkey	√			√
United Kingdom	√			√
United States	√	<√>	<√>	
Memorandum item:				
Number of central banks (out of 20)	17	11	14	14

Sources: The Dexia Central Bank Directory 2009; and central banks websites.

1/ A √ indicates that there is an explicit reference in the law. In some cases a financial stability objective may be referred to outside of the law, for example in memoranda of understanding. Oversight over the payment system is not covered here.

2/ A √ indicates that the central bank has a lead responsibility, while <√> indicates a function is shared with other agencies, and * indicates that the central bank does not have a responsibility, but can conduct or participate in supervision activities (such as on-site supervision).

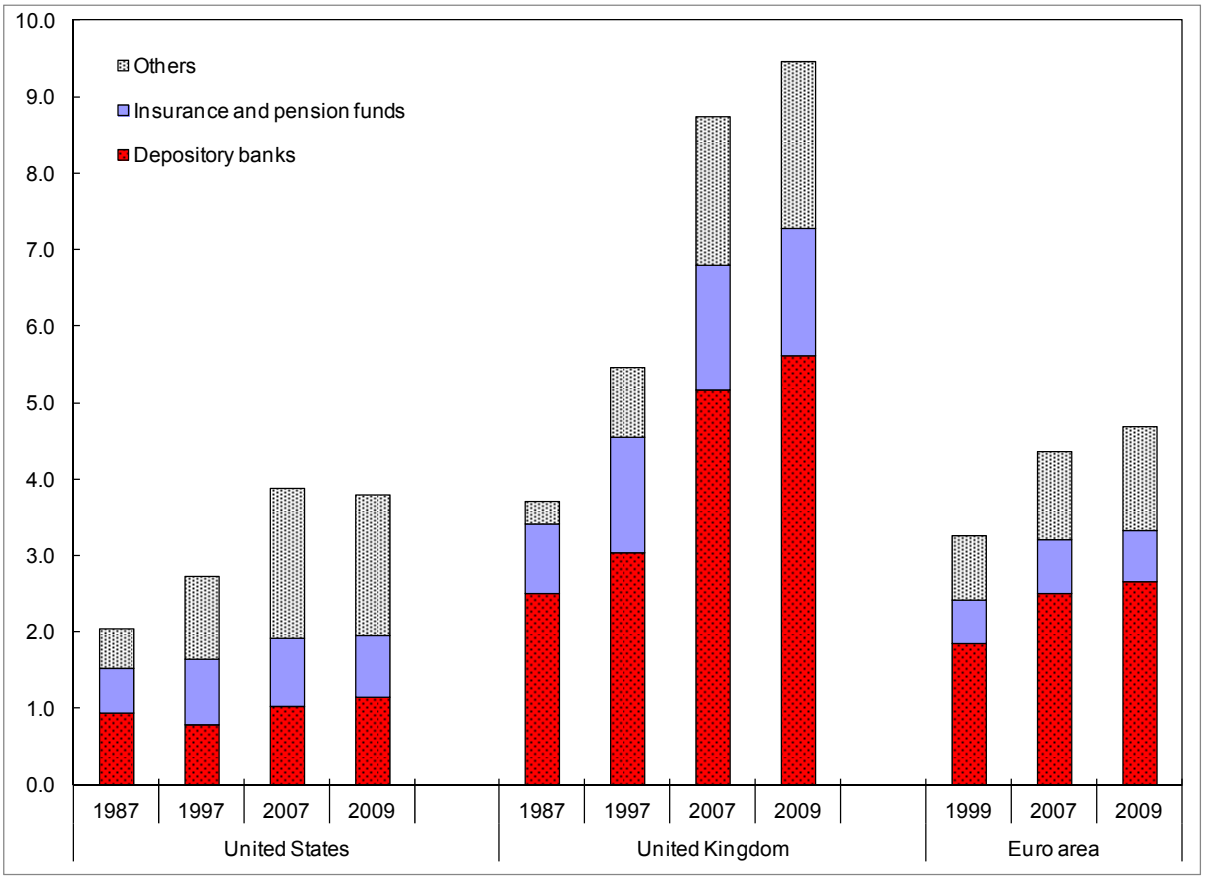
Figure 1. Inflation and Macroeconomic Volatility [1/]



1/ Volatility is gauged as the mean absolute error between annual observations and an HP trend. The HP filter was run on growth and inflation from the period 1965 to 2012, with a lambda of 100 (for 2008 to 2012, the average rates from 1990 to 2007 were used).

Figure 2. Selected Countries: Size of Financial Assets[1/]

(In multiples of GDP)



Sources: U.S. Board of Governors of the Federal Reserve System; Bank of England; European Central Bank; and IMF staff estimates.

[1/] For the euro area, 2009 data are for the third quarter.