

Future Challenges for Monetary Statistics in a Changing Environment: Rethinking Monetary Analysis and Statistics

Muhammad Ibrahim¹

Introduction

The financial crisis in the advanced economies and the ensuing recession that affected the global economy in recent years was a defining moment for macroeconomic policy. The crisis brought home important lessons for macroeconomic policy formulation and forces us to rethink policies that were considered sacrosanct and led to the adoption of more pragmatic policies albeit some of them were considered earlier as unconventional. It is encouraging that, already, there are efforts to rethink the features that should characterize a new macroeconomic policy framework.² While this area of work progresses, equally important are efforts to identify our information needs and to address any data gaps in a systematic and comprehensive manner. With new data and the information it yields, we would be in a better position to capture trends and identify potential risks facing us.

The centre of attention with respect to data gaps has been with respect to financial stability. This paper attempts to explore issues relating to monetary analysis and statistics. Monetary and financial stability analysis and related data requirements are, however, very much interrelated. As such, the paper will not limit comments only to monetary analysis and statistics.

This paper proceeds in four steps. It first reviews the lessons of the recent crisis and the implications for monetary and financial analysis. The second part assesses the implications for future data needs. The third discusses current initiatives to meet evolving data needs and its sufficiency. Finally, the last part offers some principles to guide the process of designing, compiling and disseminating statistics.

¹ The views expressed in this paper are those of the author and do not necessarily represent the stance or policy of Bank Negara Malaysia. The author would like to thank Paul Van den Bergh, Dr Norhana Endut, Toh Hock Chai, Raja Syamsul Anwar, Rubin Sivabalan and Ili Sarah Aspar for their assistance and research input.

² See for example Blanchard, Dell'Ariccia and Mauro (2010), Caruana (2011) and Hannoun (2012),

Lessons from the Global Financial and Economic Crisis

The recent episodes of crises has illustrated how increasingly complex and interconnected the world has become. Failure to contain a housing bubble, abetted by unfettered financial market innovation, has resulted in the most severe global recession since the Great Depression. Noteworthy was the extent of contagion and spillover effects whereby a mortgage and banking crisis in one country contributed to financial and sovereign debt crisis in others, and induced a recession globally.

There are at least three important implications for central banks arising from these observations. First, monetary and financial surveillance are mutually reinforcing. This implies that monetary analysis must expand beyond looking at medium term risk to growth and inflation to take account of long-term risks from financial imbalances and balance sheet vulnerabilities. Second, information gaps continue to remain large and have to be closed, including large off-balance sheet operations. Third, a more interconnected world, especially financially, means that the impact of crisis and policies is not isolated to a single country or region. This paper would elaborate briefly on each of these topics.

Lesson 1: Monetary policy and financial stability surveillance are mutually reinforcing

Developments in recent years have demonstrated that monetary policy and financial stability, in many ways, are intertwined. Early on, there was recognition that monetary and price stability are prerequisites for financial stability.³ Limiting fluctuations in the inflation rate will also tend to limit financial instability by lessening the information problems, uncertainties and distortions associated with making investment and consumption decisions.⁴

³ See for example Schwartz (1995) and Bordo and Wheelock (1998)

⁴ Inflation encourages speculative investment and borrowing because of expectations that prices will continue to rise. However, when disinflation sets in, the nominal returns to investment will be lower than what was anticipated and the real burden of debt will be higher. The lower than expected return on investment may prove insufficient to repay loans, causing defaults which reduces the equity of lenders.

Now it has been amply demonstrated that the monetary policy setting also has a direct and significant bearing on financial stability by influencing the build-up of financial imbalances. An interest rate level that is too low for a prolonged period creates distortions in the form of under-pricing of risks, excessive yield seeking activities, over-investment in certain markets, and asset prices that depart substantially from their fundamental values. As such, while the objective of monetary policy is price stability, its stance must be calibrated so that it will not lead to the build-up of financial imbalances. In other words, a narrow focus on price stability may be inconsistent with the attainment of sustainable medium to long term macroeconomic stability.

The recent financial crisis also showed that the relationship between monetary policy and financial stability runs both ways. Given the pivotal role of the financial system in the intermediation process, a breakdown in financial stability can disrupt the monetary policy transmission mechanism by disrupting financial intermediation and flow of credit to the economy. Increasingly, however, the direct impact of financial instability to overall macroeconomic stability has become more apparent. For example, the collapse in house prices during the US subprime mortgage crisis had significant impact on the household balance sheet. The loss in household wealth resulted in a sharp cut back of private consumption and overall economic activity.

Given this deep relationship, the crisis has prompted an examination of ways in which synergies between monetary policy and financial stability can be realised.⁵ In the sphere of surveillance, two areas stand out.

First, better information on regulated banking and the financial sector can facilitate a more complete macroeconomic risk assessment. This in turn allows the central bank to act pre-emptively to prevent imbalances and also ensure timely responses during crisis times. Given that monetary policy is a blunt tool that affects overall lending in

⁵ Even before the recent crisis however, there were already discussions on this. For example, Borio and Lowe (2002) had suggested that greater cooperation between monetary and prudential authorities should not just be in the management of crisis but also in preventing their emergence.

the economy, macroprudential policy provides central banks with a broader complement of powers and instruments to pre-emptively address financial imbalances or undertake policy fine-tuning.

Second, supplementing conventional monetary analysis with assessments on financial imbalances and balance sheet vulnerabilities allows surveillance at longer horizons and facilitates assessment of long-term macroeconomic sustainability. Central banks have generally focused on assessments of macroeconomic data to ascertain short to medium term risk to growth and inflation. The global crisis, however, has proven that long term risks from the build up of financial imbalances and balance sheet vulnerabilities cannot be ignored. This implies the need for further layers of monetary analysis.

There is a need for deeper analysis of monetary aggregates and financing activity, as the build up of financial imbalances are usually rooted in the excessive growth of credit.⁶ Credit booms tend to amplify internal financial imbalances by fueling excessive demand, inflationary pressures and speculative asset bubbles.⁷ This implies an important role in monitoring and perhaps containing credit in avoiding the build of asset bubbles.

Unlike traditional analysis, which is based on the examination of *flow* variables, there is also the need for a perspective which focuses on the *stock* variable, namely analysis of a country's sectoral and aggregate balance sheets. Balance sheets play an important role in macro surveillance, as balance sheet weaknesses can contribute to the origin and propagation of crisis as well as affect the efficacy and scope for counter cyclical policies.⁸

⁶ Kaminsky and Reinhart (1999)

⁷ Allen and Gale (2000)

⁸ See Allen, Rosenberg et al. (2002) and Singh (2011)

Examination of major crisis from 1990 to the recent euro debt crisis in 2011 reveals that most crises can be partly attributed to one or more balance sheet vulnerabilities (Chart 1). In the 1990s, vulnerabilities were concentrated mainly in the household and firm balance sheets, such as during the Asian Financial Crisis, while the government balance sheet was generally healthy. Crisis in the 2000s however centered around the balance sheet of the government, such as the euro debt crisis, which can be more costly as there is limited scope for counter-cyclical policies thus resulting in a more protracted crisis. Also notable is that almost all crisis are rooted on financial institutions through leverage.

Balance sheet assessment of various crisis, 1990-2011

| Country | Finland (1991) | Sweden (1991) | Mexico (1994) | Argentina (1995) | Japan (1995) | Thailand (1997) | Korea (1997) | Indonesia (1997) | Malaysia (1997) | Russia (1998) | Brazil (1999) | Turkey (2000) | Argentina (2001) | Uruguay (2002) | US (2007) | Iceland (2008) | Greece (2011) |
|-----------------|----------------|---------------|---------------|------------------|--------------|-----------------|--------------|------------------|-----------------|---------------|---------------|---------------|------------------|----------------|-----------|----------------|---------------|
| Household | ■ | ■ | | | | | | | | | | | | | | | |
| Firms | ■ | ■ | | | | | | | | | | | | | | | |
| Financial Inst. | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Central Bank | | | | | | | | | | | | | | | | | |
| Government | | | ■ | | | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

■ Source of vulnerability
 ■ Constraint on recovery

Source: Internal estimates; list of crisis from "IMF-FSB Early Warning Exercise" (September 2010)

Lesson 2: Surveillance must keep up with increasing financial market sophistication

The recent global financial crisis highlighted several important lessons in the area of financial regulation. First, there was the failure to regulate excessive speculative activity. Lack of oversight on rapidly growing financial innovation meant that the surge in financial market innovation and complex structured products was left to grow unchecked and unhindered. The over-the counter (OTC) derivatives market, in

terms of gross market values⁹ was estimated to have tripled from USD9.8 trillion in Dec 2006 to USD35.3 trillion in Dec 2008. At the same time, financial institutions became highly leveraged, increasing their appetite for risky investments and reducing their resilience in the event of losses.

Second, financial innovation contributed to the mispricing of risks in the financial system. The presence of off-balance sheet items, structured products and securitization activity enabled institutions to seemingly offload and minimise risks they would not have otherwise. This in turn may have contributed to higher risk-taking activities. In 2007, it was estimated that the shadow banking system in the US, which supported securitization activity had overtook the traditional banking system in terms of size¹⁰, as measured by the size of its assets.

Third, the impact of the crisis was worsened by the interlinkages and interdependencies between financial market players. Financial innovation multiplied the number of agents exposed to a single underlying asset, as the asset could be broken up, repackaged and resold for an almost infinite number of times. This made the financial system as a whole more vulnerable to individual failures. During the global financial crisis, the uncertainty surrounding the exposure of institutions to toxic financial assets and the failure of Lehman Brothers in 2008 triggered a freeze in credit and money markets, making it difficult for other, possibly unexposed institutions to obtain funding to meet short-term liquidity obligations. This goes to show that systemic risk should not be underestimated. Even though an institution may be judged to be sound on its own, it may still be affected by the failure of another institution, either through direct exposure such as debt holdings, or indirectly such as its access to market funding.

⁹ Data from the BIS. Gross market values are calculated as the sum of the total gross positive market value of contracts and absolute value of gross negative market value of contracts with non-reporting counterparties

¹⁰ Geithner (2008)

Despite the sweeping changes to the financial system, it was evident that there was a paucity of understanding on the nature of risk inherent in the complex financial products and an underestimation of the overall build-up of risks in the financial system. Policy-makers need to ensure that the regulatory and surveillance framework continues to evolve such that it is able to accurately capture the risks from complex instruments and to account for hidden risks such as off-balance sheet items and systemic risk.

Lesson of 3: Better awareness of risks from greater global interconnectedness is necessary

Increasing globalisation and financial integration have made financial markets more interconnected. As a result, the reach of a crisis is not isolated to a single country or region. This raises the pertinent question on whether currently available cross-border statistics are adequately robust and timely to detect the build-up of risk arising from factors that are beyond national borders.

The financial crisis of 2008 has shown that there are multiple contagion and spill-over channels formed through higher degrees of integration between financial markets across borders.¹¹ For example, the tightness in the US interbank credit market during the crisis has forced US banks to cover liquidity shortages by deleveraging from emerging market economies (EMEs), causing a liquidity drain in EMEs. The global equity market also exhibited interdependency as major stock markets around the world plummeted during the wake of the crisis. In such an environment, high-quality cross-border statistics play an important role to detect these contagion and spill-over channels and anticipate the transfer of risk to the domestic financial market.

¹¹ See for example Lee and Park (2008)

Information Gaps uncovered by the Global Financial and Economic Crisis

Having highlighted some of the information gaps in monetary and financial surveillance, this paper will now attempt to shed light on some of the types of data needed to fill those gaps. In a general sense, the three perennial issues facing authorities is the extent of data coverage, granularity and timeliness. Indeed, it has been noted that the surprise element at the onset of a financial crisis is often due to the lack of high quality, comprehensive data.¹² Insufficient coverage and depth of information can also potentially put policymakers at risk of arriving at the wrong conclusion and thus prescribing the wrong policy measures. Timeliness of data is equally important for the authorities to detect and respond to risks in an effective manner, while standardisation allows for easy cross-comparison to detect idiosyncratic peculiarities from the whole. The remainder of this section elaborates on some of the enhancements to the statistics that are needed to support a monetary surveillance framework that is more relevant to the current environment.

Monetary policy and financial stability surveillance

It must be recognized that the coverage of surveillance for monetary policy and financial stability are broadly similar with a high degree of overlap between the two. The difference is in the focus of surveillance. For example, in the case of credit, monetary policy assessments on credit are done to ascertain the sustainability of economic growth or to assess the risk to inflation from overheating. This may also require aggregate credit data or credit by the various sectors of the economy. Recently, more granular data is also being used to assess risks to macroeconomic stability. For financial stability purposes, assessments on credit are also done to ascertain whether credit growth is excessive and could contribute to financial imbalances and the build-up of institutional or systemic risk. This may require credit data at a granular level, including by localities and income group, as well as by financial institution. As such, data collection should be undertaken with sufficient flexibilities in the data dimensions such that the information can be organised or

¹² For example, Edwards (2008) noted that the Asian crisis revealed major gaps in statistical coverage of the domestic financial sector and the external sector that permitted serious vulnerabilities to remain undetected.

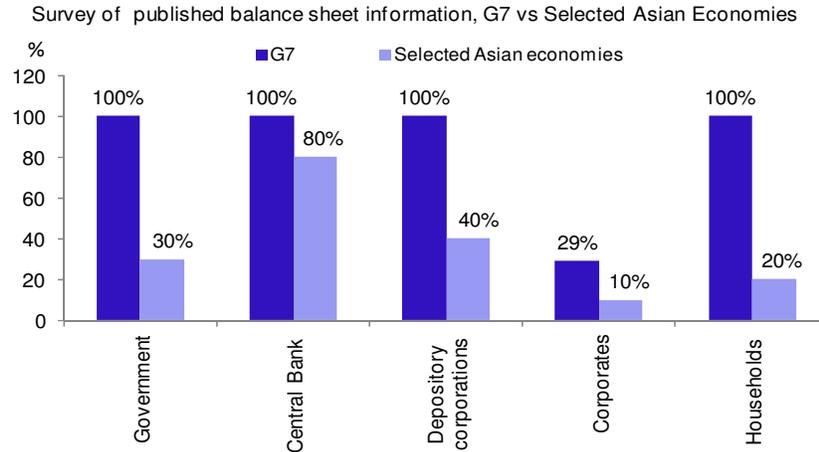
collapsed to meet the surveillance needs of both monetary and financial stability areas.

As earlier indicated, both monetary and financial stability analysis and surveillance need to look not only at flows but also at amounts outstanding or stocks. While balance sheets for depository institutions are widely available for advanced and some Asian economies, it must be noted that data does not cover other financial institutions, such as hedge funds, pension funds and insurance companies. As seen during the US subprime crisis, the absence of balance sheets of the shadow banking sector is a blind spot which could limit the country's ability to anticipate or respond to shocks to the economy. The results of our survey also suggest that availability of balance sheets are, in general, more limited among Asian economies, compared to advanced economies. This gap is especially observed for households, financial corporations and government balance sheets. This deficiency poses challenges to policy-making, as it complicates detection of vulnerabilities, build-up of risk and propagation of shocks from one sector to another.

Of particular concern are the large deficiencies in balance sheet data for corporates in both the advanced and emerging economies (Chart 2).¹³ Of the countries surveyed in this paper, only Korea, the United States and Germany publish extensive data on corporate balance sheets which include balance sheets of small and medium enterprises (SMEs). This contrasts sharply with the current literature which suggests that corporate balance sheets play a very significant role in determining the likelihood and depth of external crises.¹⁴

¹³ In order to assess the accessibility of balance sheet data, this paper undertakes a survey of published balance sheet data obtained from various sources. Data of central banks, financial and depository corporations were obtained from IMF International Financial Statistics and OECD Statistics which consolidates data from National Authorities. The balance sheets of households and businesses were sourced from National Authority websites including central bank and national statistics websites.

¹⁴ Mulder, Perrelli and Rocha (2002)



*Survey of published sectoral balance sheet information of 7 advanced economies and 10 emerging economies
 Source: Internal estimates, National Authorities (Central Bank and Office of National Statistics), IMF, OECD.
 Date: Data as at 15 March 2012.*

Financial market surveillance

Many central banks now have expanded mandates to encompass financial stability. To perform the expanded role effectively, data weaknesses must be addressed, especially in detecting speculation, evaluating risk, and identifying interlinkages. It is currently difficult to separate investments made for hedging purposes, for real activity, or for speculation. An effective way to improve the detection of excessive speculation would be to introduce finer categorisation for reporting financial transactions. Better information regarding investor profile, in terms leverage, duration and maturity profile, would aid in understanding the exposure of domestic markets to internal and external factors. As the number and complexity of financial intermediaries increased, especially in the unregulated areas of the financial system, information on OTC derivatives, structured products, and off-balance sheet items is needed to better identify institutional and systemic risks and get a better sense of the interlinkages, both domestically and internationally.

International dimension of data

Cross-border statistics are very useful to detect risks that may arise from factors beyond national borders such as capital flows and banking system risk exposures.

While there are many forms of cross-border statistics made available by commercial data providers, statistical offices of individual countries and organisations such as the IMF and BIS, it is often inconsistent and incomparable across different sources¹⁵. In addition, currently available cross-border data still falls short in terms of timeliness where data frequency does not match the daily movements of the financial market and lags in published data exist. Even though efforts are being made to standardise data, for example through BIS' Banking Statistic and IMF's Coordinated Portfolio Investment Survey, there is still a glaring lack of participation from key countries and lack of granularity which limits the usefulness of the data. These limiting factors make it difficult for regulatory authorities to anticipate the build-up of risk in the financial systems of both creditor and debtor countries and to design remedial measures. Closing these information gaps would allow for a richer assessment of cross-border data to include more up-to-date analysis and benchmarking processes which are key components of an effective surveillance system.¹⁶ Nevertheless, in the interim, market analysts and policy makers should better understand and make fuller use of the already substantial amount of information available in this area.

¹⁵ González-Páramo (2006)

¹⁶ The recommendations by the Financial Stability Board and the IMF to the G20 address the gaps with respect to cross-border data.

Table 1: Information Gaps and Complications

| Information gaps | Complications | Useful information |
|------------------|--|---|
| Granularity | <p>Dimensions of data collected still limited, difficult to detect pockets of imbalances</p> <p>Aggregated data masked vulnerabilities in certain segments, i.e. low income</p> <p>Inability to differentiate investments for hedging, for real activity, or for speculation</p> <p>Unclear picture of inter-institutional exposures</p> <p>Unclear picture of probability of cascading failure</p> <p>Standardised and published cross-border data still lacks granularity, restricting scope of analysis</p> | <p>Granular data with expanded dimension to include, for example, localities and income groups</p> <p>Deeper categorisation into investment purpose</p> <p>Deeper coverage of non-resident presence in domestic markets, products, type of investment, duration and maturity profile.</p> <p>Non-resident holdings of domestic securities</p> <p>Portfolio flows by sector and instrument</p> |
| Coverage | <p>Significant gaps in balance sheet and cash flow data; difficult to detect vulnerabilities and anticipate transmission of shocks</p> <p>Inability to accurately detect excessive speculation</p> <p>Incomplete data sets that do not enable the correct assessment of individual risk, and to separate from systemic risk</p> <p>Not all countries participate in data reporting; layers of risk not apparent</p> | <p>Balance sheet of corporates, incl. SMEs</p> <p>Balance sheet of FIs to incl. non-depository corporations</p> <p>Complete cash flow information, incl. outlays</p> <p>Data on wealth dispersion</p> <p>Wider coverage on OTC derivative, structured products, leverage ratios, and off-balance sheet items</p> <p>Exposure of unregulated institutions like hedge funds and corporations</p> <p>Coverage on size and structure of unregulated shadow banking</p> <p>Bank flows data with higher participation by EME countries</p> <p>Immediate and ultimate holder of risk</p> |
| Timeliness | <p>Published balance sheet data are high infrequency, therefore lags and infrequent data complicates surveillance</p> <p>Banking system/financial markets movements are high frequency, therefore lags and infrequent data complicates surveillance</p> | <p>More frequent and timely information on balance sheet</p> <p>Close to real-time portfolio and bank flows data</p> |
| Standardisation | <p>Different regions have different levels of coverage and granularity in terms of domestic market information</p> <p>Countries compile and calculate data differently, difficult to benchmark</p> | <p>Have a standard format in reporting non-resident holdings, off-balance sheet items, and purpose of investments</p> <p>Standardised data e.g. across BIS Consolidated Statistics, IMF Coordinated Portfolio Investment Survey, EPFR country flows</p> |

■ MP and FS
 ■ Financial market
 ■ International dimension

Source: Internal Assessment

Statistical Initiatives to Fill Information Gaps

Looking back at the history of financial crises, each crisis revealed different causes and information gaps, which in most cases led to various calls for statistical initiatives to be implemented. Although most of the information gaps in the Asian financial crisis were addressed by various statistical initiatives at national and international levels, at best it would help to better understand trends but would not avert the occurrence of the next crisis. In fact, every financial crisis revealed information gaps in different areas.

The recent financial crisis has led to a collective call by various national authorities and multilateral agencies such as the IMF, World Bank, BIS, ECB, Financial Stability Board, G20, Basel III and International Organisation of Securities Commission (IOSCO) to address the information gaps through new statistical initiatives. The report on Financial Crisis and Information Gaps by the IMF and the FSB in 2009 identified the lack of information in three key areas, i.e. build-up of risks in the financial sector; international financial network connections; and the vulnerability of domestic economies to shocks. The report also presented 20 high-level recommendations to address the information gaps and improvements on the communication of official statistics. Although the focus of the report is on systemically important economies, such as the G-20 countries, the recommendations are also applicable to other jurisdictions for implementation at the national level. Efforts are on-going to implement the recommendations across various jurisdictions and to monitor the progress of the initiatives. There are also initiatives to improve the collection of micro data such as income, credit and securities holdings at the national and international levels.

Although the current initiatives point towards the right direction and will significantly improve the coverage, granularity and timeliness of data for policy makers, more need to be done, by both the statisticians and policy makers to clearly identify information gaps to better position economies to pre-empt or avoid another crisis. In particular, statisticians need to be proactive in identifying advance indicators for collection to facilitate early analysis and surveillance by policy makers. In addition, policy makers and statistical analysts must have a sound understanding of the data and conduct active and early analysis of data to identify risks and weaknesses and swiftly formulate and implement anticipatory measures to prevent a crisis from developing. Nevertheless, it should be recognised that currently available data can already facilitate good analysis, both in the monetary and financial stability areas at the national and the international level. Efforts should be made to exploit and mine existing data to the fullest extent possible and to analyse these data from different angles and perspectives.

Guiding principles for Effective Design, Compilation and Publication of Statistics

In light of the new data requirements identified in the earlier discussions, this section outlines some guiding principles from the design stage, to collection and the dissemination to ensure effective and cost-efficient collection of statistics.

First, at the design stage, there should be clarity about what is needed. Collecting data can be costly and having too much information could also be a problem. Data collection is made even more complex when it entails coordination with other authorities. As such, the costs and benefits of collecting the said data should be carefully weighed. Second, there is a need to understand and transcend data limitations. For example, even with sophisticated systems, one cannot fully capture the risks inherent in the economy and financial system as a whole. Hence, the challenge is to find ways to work around these limitations. Third, data collection should also be pre-emptive. Foresight will be required to ensure new data requirements will aid in preventing the next generation of crisis and not just focused on plugging current gaps.

Fourth, during compilation, integrity and reliability is key in producing high-quality data. Data should be reported honestly and without tampering. Fifth, this in turn should be complimented by having proper reporting compliance requirements and the cross-checking of information to ensure data reliability.

Finally, at the dissemination stage, access to data should be made as widely available as possible to ensure better risk management and analysis at all levels. In this regard, access to data must also be intuitive and timely, to facilitate analysis and detection of risks. Available statistics together with improvements made and new developments in data management need to be communicated effectively and carried out in close collaboration with policy-makers, analysts and the financial industry.

Conclusion

This paper examines some of the lessons from the recent global economic and financial crisis, and draws some of the implications in terms of monetary surveillance and the resultant future data needs. The recent crisis in the advanced economies and the ensuing global economic recession underscored the importance for monetary surveillance to take into account the deep interaction between monetary policy and financial stability, the growing financial market sophistication, as well as the greater economic and financial integration globally. This, in turn implies a pressing need to close information gaps in terms of coverage, granularity, timeliness and standardisation of data. At the same time, it must be acknowledged that current statistical initiatives are moving in the right direction to close some of these gaps. Nevertheless, where possible, more should be done. Lastly, to be effective and to minimise the costs, data collection must be guided by best practices from the design stage, to the collection and all the way to the dissemination. In this regard, data collection must have clarity, transcend limitations, be pre-emptive, have a high degree of integrity and appropriate oversight and have user needs and accessibility in mind.

In this changing environment statistical compilers, policy makers, supervisors and economists need to work in close collaboration, to better understand financial innovations and practices and be able to identify new trends and advance indicators for effective surveillance of monetary and financial conditions. Armed with good data and sound understanding, policy makers can implement swift and firm anticipatory measures to avert a crisis.

Selected References

Allen, Franklin and Gale, Douglas (2000), "Asset Price Bubbles and Monetary Policy," Center for Financial Institutions Working Papers 01-26, Wharton School Center for Financial Institutions, University of Pennsylvania.

Baker, Colleen M. (2010), "Regulating the Invisible: The Case of Over-the-Counter Derivatives," Notre Dame Law Review, Vol. 85, p. 1287, 2010; Notre Dame Legal Studies Paper No. 03-11.

Blanchard, Olivier, Giovanni Dell'Araccia and Paolo Mauro (2010), "Rethinking Macroeconomic Policy", Journal of Money, Credit and Banking, Vol. 42, September.

Bordo, Michael D. and David C. Wheelock (1998), "Price Stability and Financial Stability: The Historical Record", FRB of St. Louis Review, September/October.

Borio, Claudio and Philip Lowe (2002), "Asset Prices, Financial and Monetary Stability: Exploring the Nexus", BIS Working Papers No. 114.

Caruana, Jaime (2011) "Central banking between past and future: which way forward after the crisis?" Speech at the South African Reserve Bank 90th Anniversary Seminar, Pretoria, July 2011.

Edwards, Robert W. (2008), "Policy and Statistical Issues Underpinning Financial Stability: The IMF Perspective," Statistics, Knowledge and Policy 2007: Measuring and Fostering the Progress of Societies, OECD, Paris.

ECB (2010), "Central Bank Statistics – What did the financial crisis change?" Fifth ECB Conference on Statistics.

FSB (2011), "Overview of Progress in the Implementation of the G20 Recommendations for Strengthening Financial Stability", Report of the Financial Stability Board to G20 Leaders.

Geithner, Timothy (2008), "Remarks at The Economic Club of New York", New York City

González-Páramo, José Manuel (2006), "The importance of High Quality Cross-border Portfolio Investment Statistics", Keynote address by Member of the Executive Board of the ECB (March 2006).

Hannoun, Hervé (2012) "Monetary policy in the crisis: testing the limits of monetary policy" Speech at the 47th SEACEN Governors' Conference, Seoul, Korea, February 2012.

IMF and FSB (2009), "The Financial Crisis and Information Gaps", Report to the G-20 Finance Ministers and Central Bank Governors.

Kaminsky, Graciela L. and Reinhart, Carmen M. (1999), "The Twin Crises: The Causes of Banking and Balance-of-Payments Problems," American Economic Review, American Economic Association, vol. 89(3), pages 473-500, June.

Lee, J. W. and Park, C.Y. (2008), "Global Financial Turmoil: Impact and Challenges for Asia's Financial Systems", Working Paper Series on Regional Economic Integration No. 18, Asian Development Bank.

Mark, Allen et. al (2002), "A Balance Sheet Approach to Financial Crisis", IMF WP/02/210.

Mulder, C., et. al. (2002), "The Role of Corporate, Legal and Macroeconomic Balance Sheet Indicators in Crisis Detection and Prevention," IMF Working Paper, Policy Development and Review Department, IMF (March).

Nersisyan, Yeva and Wray, L. Randall (2010), "The Global Financial Crisis and the Shift to Shadow Banking," Levy Economics Institute Working Paper No. 587.

Papademos, Lucas (2006), "Price stability, financial stability and efficiency, and monetary policy," Speech at the Third conference of the Monetary Stability Foundation, Frankfurt (July).

Pozsar, Zoltan, Adrian, Tobias, Ashcraft, Adam B. and Boesky, Haley (2010), "Shadow Banking," Federal Reserve Bank of New York Staff Reports No. 458.

Rausser, Gordon, Balson, William, Stevens, Reid(2010), "Centralized clearing for over-the-counter derivatives," Journal of Financial Economic Policy, Vol. 2 Iss: 4, pp.346-359.

Reinhart, Carmen M. and K. Rogoff (2008), "Banking Crises: An Equal Opportunity Menace", NBER Working Paper No. 14587.

Schwartz, Anna J.(1995), "Why Financial Stability Depends on Price Stability," Economic Affairs, 15(4).

Singh, Sukudhew (2011), "Implications of Balance Sheets for Macroeconomic Policies: The ASEAN+4 Perspective," 8th Chief Economists' Workshop, Centre for Central Banking Studies, Bank of England, May 2011.

United States Senate Permanent Subcommittee on Investigations (2011), "Wall Street and the Financial Crisis: Anatomy of a Financial Collapse" (Levin-Coburn report).