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IMF Working Paper

Financial Stability Analysis: What are the Data Needs?

by Robert Heath and Evrim Bese Goksu

IMF Working Papers describe research in progress by the author(s) and are published to elicit comments and to encourage debate. The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

I N T E R N A T I O N A L M O N E T A R Y F U N D

IMF Working Paper

Statistics Department

Financial Stability Analysis: What are the Data Needs?

Prepared by Robert Heath and Evrim Bese Goksu¹

Authorized for distribution by Gabriel Quirós

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Abstract

The growing incidences of financial crises and their damage to the economy has led policy makers to sharpen the focus on financial stability analysis (FSA), crisis prevention and management over the past 10–15 years. The statistical world has reacted with a number of initiatives, but does more need to be done? Taking a holistic view, based on a review of experiences of policy makers and analysts, this paper identifies common international threads in the data needed for FSA and suggests ways to address these. While there has been an encouragingly constructive response by statisticians, not least through the G-20 Data Gaps Initiative, more work is needed, including with regard to shadow banking, capital flows, corporate borrowing, and granular data. Further, to support FSA, the paper identifies potential enhancements to the conceptual advice in statistical manuals including with regard to foreign currency and remaining maturity.

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Keywords: financial stability, data gaps, financial interconnections, spillovers, financial sector, credit, debt, global financial crisis, macro-prudential analysis, macroeconomic statistical manuals, stress testing.

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Contents	Page
Abstract.....	2
Acronyms.....	4
I. Introduction	6
II. Financial Stability Policy and Analysis	7
III. Data used In Financial Stability Analysis.....	14
IV. What Data Gaps Have Emerged?	20
V. How can FSA Data Needs be Addressed in Economic and Financial Statistical Manuals?	36
VI. Concluding Remarks	41
 Figures	
1. Key Data used for FSA.....	16
2. Key Data Gaps and the Suggested Way to Close Them.....	34
 Appendices	
1. Data Used in FSA	42
2. What has been the Response of Statisticians to the Growing Interest in FSA?	51
References.....	56

ACRONYMS

ATM	Automated Teller Machines
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
BoE	Bank of England
BoP	Balance of Payments
BOPCOM	Committee on Balance of Payments Statistics
BPM	Balance of Payments Manual
<i>BPM6</i>	<i>Balance of Payments and International Investment Position Manual</i> , sixth edition
BSA	Balance Sheet Approach
CCP	Central Counterparties
CDIS	Coordinated Direct Investment Survey
CDM	Concentration and Distribution Measures
CGFS	Committee on Global Financial System
COFER	Currency Composition of Official Foreign Exchange Reserves Survey
CPIS	Coordinated Portfolio Investment Survey
CPPI	Commercial Property Price Indices
DGI	Data Gaps Initiative
DGI-2	Second Phase of the Data Gaps Initiative
D-SIB	Domestically Systemically Important Bank
DSTI	Debt-service-to-income
EBIT	Earnings before Interest and Tax
ECB	European Central Bank
e-GDDS	Enhanced General Data Dissemination System
EME	Emerging Market Economies
ESRB	European Systemic Risk Board
FDI	Foreign Direct Investment
FSA	Financial Stability Analysis
FSAP	Financial Sector Assessment Program
FSB	Financial Stability Board
FSIs	Financial Soundness Indicators
FSOC	US Financial Stability Oversight Committee
FSR	Financial Stability Review
FX	Foreign Exchange
G-20	Group of 20
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GFSR	Global Financial Stability Report
G-SIBs	Global Systemically Important Banks
G-SIIs	Global Systemically Important Insurers
HH	Households
IAG	Inter-Agency Group on Economic and Financial Statistics
IAIS	International Association of Insurance Supervisors
IBS	International Banking Statistics

IDS	International Debt Securities
IFA	International Financial Architecture
IIP	International Investment Position
ILO	International Labour Organization
IMF	International Monetary Fund
IMFC	International Monetary and Financial Committee
IO	International Organization
ISWGPS	Inter-Secretariat Working Group on Price Statistics
LCR	Liquidity Coverage Ratio
LDCs	Less Developed Countries
LEI	Legal Entity Identifier
LTI	Loan-to-income
LTV	Loan-to-value
MFSMCG	Monetary and Financial Statistics Manual and Compilation Guide
MMFs	Money Market Funds
MS	Monetary Statistics
NBFIs	Non-bank Financial Institutions
NFCs	Non-financial Corporations
NSFR	Net Stable Funding Ratio
NPLs	Non-performing loans
OECD	Organization for Economic Co-operation and Development
OFR	US Office of Financial Research
OCVA	Other Changes in Volume of Assets
PGI	Principal Global Indicators
RPPI	Residential Property Price Indices
SDDS	Special Data Dissemination Standard
SDDS Plus	Special Data Dissemination Standard Plus
SME	Small and Medium Sized Enterprises
SNA	System of National Accounts
TFFS	Task Force on Finance Statistics
TRs	Trade Repositories
TSR	Triennial Surveillance Review
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
US	United States
WGSD	Working Group on Securities Databases

I. INTRODUCTION

The first chapter of Charles Kindleberger's 1978 seminal work on financial crises "Manias, Panics and Crashes" is entitled "Financial Crisis: A Hardy Perennial." But the chapter starts by pointing out the relative lack of such crises, particularly in advanced economies, during the several decades after World War II, the period when the core economic and financial statistical manuals of national accounts and balance of payments were developed to help support macroeconomic policy making.

Recent decades have witnessed the return of significant financial crises, notably, but not only, the global financial crisis (GFC) of 2007/8 that have resulted in significant losses to the real economy² including years of under-performance in economic growth. The growing incidences of financial crises and their damage to the economy and the well-being of the population, together with the increased scale and interconnectedness of financial transactions, and their complexity, has led policy makers to give a greater focus to financial stability analysis (FSA),³ financial system resilience, crisis prevention, and management over the past 10–15 years.

Consequential to the focus on financial stability, the desired composition of the policy makers' tool boxes and the nature of the data needed to support policy has changed. Indeed, the greater policy focus on financial stability has resulted in a global regulatory reform agenda endorsed by the Group of 20 (G-20) leaders and a significant demand for financial and economic data to support the monitoring of the risks and vulnerabilities in the system. Even though not the cause of the crisis, a lack of data hampered such monitoring in advance of the GFC. While the statistical world has subsequently reacted with a number of initiatives, including the G-20 Data Gaps Initiative (DGI) and others,⁴ the inevitable question arises as to what more needs to be done.

Against this background, the paper has two main aims. First, based on the experience of policy makers and analysts, the paper takes a holistic view of data actually used for FSA, drawing out the common international threads in analysis. To our knowledge this is the first paper to take such an approach at the international level. Second, the paper sets out the data gaps identified by policy makers that remain to be filled particularly with regard to shadow banking, capital flows, corporate borrowing, as well as a demand for more granular data, and more broadly how official statisticians can adapt their conceptual advice to better meet the needs of FSA including with regard to remaining maturity and foreign currency data.

² Laeven and Valencia (2003) estimated median output losses of banking crises between 1970 and 2011 at 23.2 percent of GDP. They updated the work in 2012, finding that for the crises that started in 2007 onwards, the median output loss reached 25 percent for those countries that experienced a banking crisis. See <https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Systemic-Banking-Crises-Database-An-Update-26015>.

³ There has also been a consequential increase in resources allocated to FSA.

⁴ For instance, see "What has Capital Flow Liberalization meant for Economic and Financial Statistics." IMF Working Paper 15/88, <http://www.imf.org/external/pubs/ft/wp/2015/wp1588.pdf>.

Inevitably, before embarking on any data enhancements statisticians would need to address the challenges, costs, and trade-offs of implementation, as well as discuss priorities with users. This paper does not specifically address these issues as it is mainly focused on setting out user needs and exploring how they could be addressed. Further, the paper recognizes that users' data needs and the priorities attached to these needs will differ based on the country circumstances.

The paper starts with a discussion of what is financial stability and how it is analyzed, identifies the datasets typically used in FSA, addresses the data gaps that have emerged, and sets out proposals for how economic and financial (macroeconomic) statistical manuals can better meet financial stability data needs without undermining their conceptual framework.⁵

II. FINANCIAL STABILITY POLICY AND ANALYSIS

The August 2016 Bank for International Settlements (BIS)/Financial Stability Board (FSB)/International Monetary Fund (IMF) report to the G-20 (G-20 report) stated that macro-prudential policy is aimed at avoiding “the risk of widespread disruption to the provision of financial services that is caused by an impairment of all or parts of the financial system, and which can cause serious negative consequences for the real economy.”⁶

While the above definition and observation might be considered as applying to financial stability policy more broadly, the latter appears to have a wider remit than macro-prudential policy. As the then Head of Financial Stability at the Reserve Bank of Australia observed in 2013, macro-prudential policy is subsumed in the broader financial stability policy framework—prudential supervision, market conduct regulation, consumer protection, land supply, tax system, and exchange rate regime.⁷ To this list could be added the functioning of market infrastructure such as clearing houses, and corporate governance and investor protection.⁸

Indeed, beyond avoiding financial crises, it would appear that financial stability policy is concerned not only with the risk of widespread disruption to the provision of financial services, but with the efficiency of those services on an on-going basis, helping to identify where policy actions might improve efficiency and reduce systemic risk. For instance, the Bank of Korea considers that financial stability is “a condition in which the financial system

⁵ The major statistical manuals such as the System of National Accounts (SNA) and the Balance of Payments Manual (BPM) are updated around every 16 years, with a long preparatory period in order to debate and agree how best to address the new issues arising. The SNA and BPM were last updated in 2008 and 2009, respectively.

⁶ IMF-FSB-BIS, 2016, “Elements of effective macro-prudential policies: Lessons from International Experience,” August 2016. See <https://www.imf.org/external/np/g20/pdf/2016/083116.pdf>.

⁷ Ellis, Luci, “Macroprudential policy, what have we learned,” Centre for Central Banking Studies, Workshop for Heads of Financial Stability, March 2013. See www.bankofengland.co.uk/research/Documents/ccbs/Workshop2013/Paper_Ellis.pdf.

⁸ See Chapter 3 of the October 2016 edition of the *Global Financial Stability Report*. <http://www.imf.org/external/pubs/ft/gfsr/2016/02/pdf/c3.pdf>.

works smoothly with all of its key components satisfactorily performing their roles: financial institutions carrying out their financial intermediary functions, market participants maintaining a high level of confidence in their financial market, and the financial infrastructure being well developed.”⁹ Indeed, while financial stability does not have a universally accepted definition, there seems to be a broad consensus that financial stability refers to the smooth functioning of the key elements that make up the financial system.^{10 11}

What has developed, particularly since the GFC, has been a greater focus on strengthening financial stability policy and analysis, with consequential data demands. Further, new governance arrangements have been established bringing together macro-prudential analysis, micro prudential analysis, and other aspects of FSA, in a holistic approach to FSA.

Relationship between micro-prudential, macro-prudential and macro-economic policy and analysis

Micro-prudential supervision¹² and market conduct regulation, etc., existed well before the GFC and as indeed, in some economies, did macro-prudential policy. But the GFC demonstrated that micro-prudential policy is necessary but not sufficient to ensure financial stability; hence the emergence of macro-prudential policy to complement micro-prudential policy with a more systemic perspective. As a former First Deputy Managing Director of the IMF observed, “macro-prudential analysis looks at the intersection of the real economy and the financial sector, providing a bird’s eye view of the entire system instead of focusing on individual instruments and individual institutions.”¹³

Macroeconomic developments and policy are directly relevant for financial stability policy as economic developments have an impact on the financial stability risks facing an economy, and vice versa. For instance, a rapidly growing economy might encourage excessive credit growth, while an economy with a weak economic position might have increasing levels of nonperforming loans. Therefore, traditional macroeconomic indicators are relevant for FSA. Nonetheless, as the August 2016 BIS/FB/IMF G-20 report observes, the difference between

⁹ See Bank of Korea, Financial Stability Bulletin June 2016. See <http://www.bok.or.kr/broadcast.action?menuNaviId=2578>.

¹⁰ In a 2004 IMF Working Paper “Defining Financial Stability,” Garry Schinasi defined financial stability as follows: “A financial system is in a range of stability whenever it is capable of facilitating (rather than impeding) the performance of an economy, and of dissipating financial imbalances that arise endogenously or as a result of significant adverse and unanticipated events.” See www.imf.org/en/Publications/WP/Issues/2016/12/31/Defining-Financial-Stability-17740.

¹¹ Osterloo and de Haan, 2004, “Central Banks and Financial Stability: A Survey,” *Journal of Financial Stability*, Vol 1, Issue 2, pages 257–273

¹² Micro-prudential supervision has focused particularly, but far from exclusively, on banking supervision, and developed in earnest from the mid-1970s with the Basel Committee on Banking Supervision established in 1975 to strengthen the regulation, supervision, and practices of individual banks worldwide.

¹³ John Lipsky “Macroprudential policy- What it is and how to do it,” October 2011. Available at www.bfg.pl/sites/default/files/dokumenty/4_2_47_2012.pdf.

macroeconomic and macro-prudential policy is that “rather than managing the level and composition of aggregate demand or the business cycle, macro-prudential policy aims to strengthen the financial system’s defenses in the face of economic and financial shocks.”

The holistic approach of FSA helps “straddle the gap” between micro and macro analysis, as it became increasingly obvious that micro-prudential analysts need macro data and macro-prudential analysts need granular micro data, and they potentially benefit from each other’s insights in order to identify emerging systemic risks and vulnerabilities. As the IMF Financial Surveillance Strategy published in 2012¹⁴ emphasized: there is a need to understand “the interactions between macro-prudential, macroeconomic, and micro-prudential policies, as well as potential costs and side effects.” In a similar vein, there have been calls for a breaking of the silos between macro-economists and financial sector specialists.¹⁵

Governance arrangements that have emerged for financial stability assessment

There has been a significant growth of governance arrangements around financial stability policy in recent years.

First, there have been enhanced institutional arrangements at both the domestic and international levels: the allocation of financial stability responsibility within domestic economies, often to the central bank; the creation of the FSB and the convening of G-20 leaders annually in support of economic and financial cooperation at the international level;¹⁶ and enhanced regulation, notably of banks, both nationally and internationally.

Second, central banks, in addition to their traditional focus on monetary policy and price stability, have increased their focus on financial stability. In some countries, financial stability committees have been established, perhaps involving multiple agencies including those with fiscal and regulatory policy responsibilities, to keep an ever-watchful eye on these risks. The allocation of financial stability responsibilities has facilitated the publication of financial stability reports on a regular, usually semi-annual, frequency to inform the public on the risks to the financial system and economy more broadly.¹⁷ At the international level, the IMF produces a semi-annual *Global Financial Stability Report (GFSR)* as a contribution to global financial stability and sustained economic growth of member countries.¹⁸ Clearly, meaningful data are an essential feature of financial stability reports at both national and international levels.

¹⁴ See “The IMF’s Financial Surveillance Strategy,” page 9, August 2012. See <https://www.imf.org/external/np/pp/eng/2012/082812.pdf>.

¹⁵ See for example, Oliver Frecaut “A National Accounts Approach to Banking Crises and Financial Stability,” IMF Working Paper 16/128. See <https://www.imf.org/external/pubs/ft/wp/2016/wp16128.pdf>.

¹⁶ The FSB was established in 2009, as the successor to the Financial Stability Forum, itself established in 1999.

¹⁷ For instance, see Martin Cihak “How do Central Banks Write on Financial Stability.” IMF Working Paper 06/163. See www.imf.org/external/pubs/ft/wp/2006/wp06163.pdf.

¹⁸ The GFSR was first published in March 2002.

Further, at the national level, financial stability departments have been created and strengthened to support this enhanced analysis. At the international level, the FSB coordinates the work of national financial authorities and international standard setting bodies in order to develop and promote the implementation of effective regulatory, supervisory and other financial sector policies;¹⁹ the IMF mandates financial system stability assessments under the Financial Sector Assessment Program (FSAP) every five years for economies with globally systemically important financial sectors (See Box 1);²⁰ while the BIS's Financial Stability Institute assists supervisors around the world in improving and strengthening their financial systems.²¹

Box 1: Financial Sector Assessment Program (FSAP)

The most comprehensive international approach to assessing the financial sector in individual economies is the IMF's FSAP. The goal of FSAP assessments is twofold: to gauge the stability and soundness of the financial sector, and to assess its potential contribution to growth and development.²²

This assessment examines three key components:²³

- the soundness of banks and other financial institutions, including stress tests;
- the quality of financial market oversight in banking and, if appropriate, insurance and securities; and
- the ability of supervisors, policy makers, and financial safety nets to respond effectively in case of a crisis.

The data requirements are focused on the first bullet—as the second and third bullets are clearly of a qualitative and judgmental nature, and include Financial Soundness Indicators (FSIs).²⁴

As mentioned above, the IMF has identified economies that from a global perspective have systemically important financial sectors. Such economies are required to have mandatory FSAPs every five years with the intent of better safeguarding global financial stability. This identification is based on an assessment of the size and interconnectedness of an economy's financial sector, using Gross Domestic Product (GDP) data on a purchasing power parity basis, and data from the BIS's Locational International Banking Statistics (IBS) and the IMF's Coordinated Portfolio Investment Survey (CPIS).²⁵

The FSAP reports for individual economies are available at <https://www.imf.org/external/np/fsap/fssa.aspx>.

¹⁹ In addition to its role in coordinating regulatory developments in the financial sector, the FSB has a focus on promoting a more resilient global financial system.

²⁰ Presently 29 economies are classified as having systemically important financial sectors. See <https://www.imf.org/external/np/fsap/mandatoryfsap.htm>.

²¹ The Financial Stability Institute was established in 1999 and has an annual program of activities. See <https://www.bis.org/fsi/activities.htm>.

²² See “The Financial Sector Assessment Program (FSAP), Factsheet” from which this text this taken. <https://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/16/14/Financial-Sector-Assessment-Program>.

²³ See “IMF Broadens Financial Surveillance: Financial Sector Assessment Program,” IMF Survey, January 2014. See www.imf.org/external/pubs/ft/survey/so/2014/POL011314A.htm.

²⁴ Typically, an FSAP report will also include a table of key macroeconomic indicators as macroeconomic developments are highly relevant for FSA.

²⁵ Equity return data from a private data provider are used to construct cross-country equity return correlations.

Stress testing

Stress tests have increasingly become integral to FSA as a method of testing the resilience of the financial sector. As noted in the foreword to the IMF book *A Guide to IMF Stress Testing: Methods and Models*,²⁶ “the GFC has placed a spotlight on the stress testing of financial systems.” These tests typically take extreme but plausible stress scenarios and test the extent to which different elements of the financial system would be able to cope and continue to provide financial services. Many central banks and/or regulatory agencies run stress tests, and some publish the results.

The balance sheet approach²⁷ is a common approach to stress testing, drawing on balance sheet data of deposit-takers and other financial institutions.²⁸ A second approach is the market price-based approach that uses market data and statistical techniques to capture interlinkages between institutions, markets, or sources of risk.²⁹ Stress tests can be top-down, conducted by the national authorities or IMF staff (typically in FSAPs) using bank-by-bank data and applying a consistent methodology and assumptions, or bottom-up, conducted by individual financial institutions using their own internal data and models based on a common scenario.³⁰ As stress tests are data intensive, with granular data often needed, it is important to have well maintained and consistent databases with appropriate access available for those conducting the stress tests.³¹

There remains room for improvement to use stress testing as a tool for macro-prudential risk assessment going beyond its traditional use for micro-prudential supervision. Demekas points out that very few stress testing models focus on, and measure correctly, the resilience of the financial system as a whole and its ability to continue providing financial intermediation

²⁶ Li L. Ong (editor), IMF, December 2014. <https://www.imf.org/external/pubs/cat/longres.aspx?sk=41117.0>.

²⁷ The terminology “balance sheet approach” used for stress testing means something different to the “Balance Sheet Approach” terminology used in economic analysis, as the former is more focused on individual institutions while the latter covers sectors within the whole economy.

²⁸ See “Introduction to the Balance Sheet-Based Approach to Stress Testing,” Christian Schneider and Liliana Schumacher, chapter 2 of *A Guide to IMF Stress Testing: Methods and Models*. See <http://www.elibrary.imf.org/staticfiles/misc/toolkit/pdf/chap2.pdf>.

²⁹ For information on liquidity stress testing approaches, see “Macroprudential Liquidity Stress Testing in FSAPs for Systemically Important Financial Systems,” Andreas A. Jobst, Li Lian Ong, and Christian Schmieder, IMF Working Paper, 17/102. See <https://www.imf.org/en/Publications/WP/Issues/2017/05/01/Macroprudential-Liquidity-Stress-Testing-in-FSAPs-for-Systemically-Important-Financial-44873>.

³⁰ See the paper “Macrofinancial Stress Testing – Principles and Practices, IMF, 2012 for seven “best practice” principles for stress testing. See www.imf.org/external/np/pp/eng/2012/082212.pdf. [Box 1 discusses and compares the balance sheet- and market price-based approaches.](#)

³¹ For instance, see the Opening remarks of IMF Deputy Managing Director, Tao Zhang at the IMF-LSE Symposium on “Macroprudential Stress Tests and Policies: A Framework,” December 15, 2016. See <http://www.imf.org/en/News/Articles/2016/12/15/SP121516-IMF-LSE-Symposium-on-Macroprudential-Stress-Tests-Policies-A-Framework>.

services under stress in a way that makes the results readily actionable for individual banks and their supervisors.³²

Financial stability policy³³

The policy applications of FSA, and particularly the tools used to meet financial stability needs, are still developing.³⁴ While there is long experience of the use of prudential regulation and micro-prudential policy tools, the same is not true for macro-prudential policy tools. Nonetheless based on international experience, the August 2016 BIS/FSB/IMF G-20 report discussed the various tools in use and their application. These include:

- broad-based capital tools (e.g., dynamic provisioning, countercyclical capital buffers, and time-varying leverage ratio caps);
- sectoral capital and asset-side tools (e.g., foreign currency loans to corporates, caps on loan-to-value (LTV), debt-service-to-income (DSTI), or loan-to-income (LTI) ratios); and
- liquidity-related tools (e.g., liquidity coverage ratio (potentially calibrated by currency)), as well as tools to contain maturity mismatch (such as core funding ratios), price-based tools (such as a levy on volatile funding), and caps such as on the loan-to-deposit ratio.

Among other policy tools have been capital surcharges for global and domestic systemically important banks (G-SIBs and D-SIBs) and, scheduled from 2022, for global systemically important insurers (G-SIIs), and increases in risk-weights and large exposure/concentration limits. Further, interbank exposure limits, and foreign and domestic currency reserve requirements are being used as policy tools to lower macro-prudential risks.³⁵

Policies have also been developed to address potential financial stability risks arising from non-bank activities, such as central clearing of over-the-counter derivatives, and in market

³² See “Designing Effective Macroprudential Stress Tests: Progress So Far and the Way Forward” Demekas Dimitri G. IMF Working Paper 15/146. See <http://www.imf.org/external/pubs/cat/longres.aspx?sk=43043.0>.

³³ Since 2008, the G-20 has promoted a comprehensive program of regulatory reforms designed to increase the resilience of the global financial system while preserving its open and integrated structure. These reforms and their implementation are presented in the annual FSB report on *Implementation and Effects of the G20 Financial Regulatory Reforms*. See <http://www.fsb.org/2016/08/implementation-and-effects-of-the-g20-financial-regulatory-reforms-2/>.

³⁴ A description of the usage of macro-prudential policies for a large, diverse sample of 119 countries over the 2000-13 period, and the relationships between the use of these policies and developments in credit and housing markets is set out in an IMF Working Paper from March 2015 “The Use and Effectiveness of Macro-prudential Policies: New Evidence,” Cerutti, Claessens, and Laeven, <https://www.imf.org/external/pubs/ft/wp/2015/wp1561.pdf>.

³⁵ For instance, see IMF Working Paper 16/110 “Changes in Prudential Policy Instruments—A New Cross-Country Database,” Eugenio Cerutti, Ricardo Correa, Elisabetta Fiorentino, and Esther Segalla. See <https://www.imf.org/external/pubs/cat/longres.aspx?sk=43945.0>.

infrastructure, such as ensuring the resilience of central counter-parties (e.g., margining requirements and liquidity resources).³⁶

It is also important to note that beyond micro, and macro-prudential policies, other types of policies can affect financial stability, such as the tax system with incentives for debt finance,³⁷ land and housing policies, affecting the supply and demand for real estate, and consumer protection affecting lending standards. Further there is an on-going debate as to whether interest rates could be used to meet financial stability policy needs,³⁸ given that monetary policy and financial stability objectives are interrelated,³⁹ and regarding the relationship between price and financial stability.⁴⁰ Also, movements in the exchange rate can have domestic financial stability implications.⁴¹ Indeed, the objectives of capital flow measures—designed to limit capital flows by influencing their size or composition, can overlap with macro-prudential policies, if the latter are designed to limit systemic risks by limiting capital flows.⁴²

To promote information sharing, the IMF, in consultation with the FSB and the BIS, is compiling a publicly available macro-prudential policy database.⁴³

³⁶ For instance, see “2015 CCP Work Plan” April 2015, FSB, Basel Committee on Banking Supervision, Basel Committee on Payments and Market Infrastructure, and IOSCO. See www.fsb.org/2015/09/2015-ccp-workplan.

³⁷ For instance, see “Tax policy, leverage and macroeconomic stability,” IMF Policy Paper, October 2016. See www.imf.org/external/np/pp/eng/2016/100716.pdf.

³⁸ For instance, see “Should monetary policy take into account risks to financial stability?” Ben Bernanke, Brookings Institute, April 2015. See <https://www.brookings.edu/blog/ben-bernanke/2015/04/07/should-monetary-policy-take-into-account-risks-to-financial-stability/>.

³⁹ As noted in the IMF Policy Paper, “Monetary Policy and Financial Stability”, September 2015, the GFC was a reminder that price stability is not sufficient for financial stability. Further the paper considered that generally monetary policy should not be altered to contain financial stability risks but that “the door should remain open as our knowledge of the relationship between monetary policy and financial risks evolves and circumstances change.” The paper is available at <http://www.imf.org/external/np/pp/eng/2015/082815a.pdf>.

⁴⁰ For instance, see “Is price stability enough?”, BIS Working Paper, April 2006, William White. See <http://www.bis.org/publ/work205.pdf>.

⁴¹ For instance, Philip Turner gives the example of movements in the exchange rate being relevant for financial stability because they have wealth effects and affect risk-taking, both by banks and in capital markets. See Turner, “Macroprudential policies, the long-term interest rate and the exchange rate,” BIS Working Papers No. 588, October 2016. See www.bis.org/publ/work588.pdf.

⁴² An example of where a macro-prudential measure might have impacted capital flows was in Korea. In 2010 the Korea authorities placed a cap on the ratio of foreign exchange (FX) derivatives positions to curb banks’ building up of excessive FX derivatives positions which tended to be financed by short-term borrowing. According to the FSAP report on Korea (2014, paragraph 31) this measure appeared to have contributed to a shift away from short-term FX funding and may have caused interbank capital flows into Korea to become less sensitive to global financial conditions.

⁴³ The development of this database was welcomed by the G-20 Finance Ministers and Central Bank Governors in their March 2017 Communiqué. See http://www.bundesfinanzministerium.de/Content/EN/Standardartikel/Topics/Featured/G20/g20-communicue.pdf;jsessionid=B8BD584DE886E90CBB5ADC14D75A167A?__blob=publicationFile&v=3.

III. DATA USED IN FINANCIAL STABILITY ANALYSIS

In drafting this paper, the authors examined a cross-section of financial stability reports and IMF's FSAP reports to identify the datasets used for FSA.⁴⁴ This section sets out the main “story” lines that emerge from this research. It is important to realize that FSA is constrained to available data and this has led policy makers to make a number of requests to official statisticians to expand available information. These requests are discussed in the next section. A more detailed discussion of the data used in FSA is provided in Appendix 1.

The complexity of modern economies is such that the potential risks and vulnerabilities are many and varied. They can also differ according to the nature of the economy, its financial system, and over time. Consequently, FSA has a very large demand for, and access to, meaningful data.⁴⁵ Having said this, it is important to recognize that not all aspects of FSA involve data as issues such as the strength of the regulatory framework and of the “safety net” also arise.

At the core, the datasets used for FSA appear to be those that have the purpose of:

- monitoring the soundness and efficiency of the financial system (institutions and markets), and the growth of credit to and indebtedness of non-financial sectors;
- identifying pockets of vulnerability emerging within the financial system;
- assessing the sustainability and vulnerability of the non-financial sectors debt positions; the potential impact on FSA of the growth in asset prices; and the financial links within and across economies that might cause shocks to permeate within the domestic economy; and
- testing for potential vulnerabilities in the system through stress tests.

Against this background, the research reveals both a common frame of analysis to address the first three bullets above and cross-cutting issues regarding the use of time series/cross sectional data and residence-based/cross-border consolidated data. The rest of this section explores these topics.

⁴⁴ The authors undertook a review of 23 recent IMF FSAPs: Algeria, Argentina, Barbados, Belarus, Canada, Comoros, Republic of Congo, Denmark, El Salvador, Germany, Hong Kong SAR, Ireland, Montenegro, Morocco, Peru, Republic of Korea, Russia, Samoa, South Africa, Switzerland, Tajikistan, United Kingdom, and United States, and financial stability reports of Australia, People’s Republic of China, ECB, IMF, Republic of Korea, Japan, Mexico, United Kingdom, and United States. The detailed list of the datasets identified by this review is available on request from the authors.

⁴⁵ As noted in the 2015 Financial Stability Report of the United States (US) Office of Financial Research (OFR) financial data must have three attributes to be useful: (1) sufficient scope (comprehensive and granular), (2) high quality (comprehensive, accurate, timely), and (3) accessible (shared and secured). Further, identification of data gaps begins by deciding on the most important questions related to potential vulnerabilities, the analytical framework to answer them, and the data needed to quantify that framework.

Also from the research undertaken, the degree of sophistication and depth of markets, the range and number of financial institutions, and the extent of interconnectedness both domestically and cross-border, impacts the scope of data monitored for FSA by countries of different economic development. But the main impression arising from the research was of the similarities of analysis and commonalities of data monitored (e.g., the structure of the financial sector, the relevance of credit and debt statistics, the need to monitor asset prices, etc.). Some datasets that are particularly relevant for developing economies are highlighted below.

Framework of analysis

Macro-economic analysis is focused on economic behavior among resident entities and between resident entities and nonresident entities, within well-defined frameworks of analysis, such as the national accounts framework, and with well-established indicators of economic performance, such as growth, inflation, employment, etc. On the other hand, FSA is focused on potential risks and vulnerabilities to the system without a firmly established theoretical framework. Nonetheless, a common frame of analysis emerges from the research the authors have undertaken broadly consistent with the three interlocking objectives set out in the August 2016 BIS/FSB/IMF G-20 report.⁴⁶ These objectives were:

- (1) increasing the resilience of the financial system to aggregate shocks by building and releasing buffers that help maintain the ability of the financial system to function effectively, even under adverse conditions;
- (2) containing the build-up of systemic vulnerabilities over time by reducing pro-cyclical feedback between asset prices and credit and containing unsustainable increases in leverage, debt stocks, and volatile funding; and
- (3) controlling structural vulnerabilities within the financial system that arise through interlinkages, common exposures, and the critical role of individual intermediaries in key markets that can render individual institutions “too-big-to-fail.”

Figure 1 provides a schematic overview of the key data needs that emerged from the authors’ research.

⁴⁶ The paper recognizes that these objectives are inter-related, or “inter-locking” as described in the BIS/FSB/IMF G-20 report. For instance, the growth of credit impacts the soundness of the banking system, while borrowing through debt securities abroad affects financial interconnectedness between domestic sectors and the rest of the world.

Figure 1. Key Data used for FSA

	1) Increasing the Resilience of the Financial System		
Key data	Financial Institutions: <ul style="list-style-type: none"> • Deposit-takers • Non-bank Financial Institutions (with domestic/foreign and state/private breakdowns) 	Financial Markets: <ul style="list-style-type: none"> • Money markets, securities and derivatives markets • Interest rates and FX rates • Infrastructure and Financial Inclusion 	
	2) Containing the build-up of Systemic Vulnerabilities: Credit, Debt and Asset Prices		
Key data	Credit-related: <ul style="list-style-type: none"> • Credit growth • Type of credit • Connected, concentrated, directed lending 	Debt-related: <ul style="list-style-type: none"> • Outstanding debt levels • Leverage ratios • Non-financial corporations, Households and Governments 	Asset Prices: <ul style="list-style-type: none"> • Real estate • Equity and bond prices
	3) Structural vulnerabilities within the financial system: Financial interconnections and spillovers		
Key data	Domestic & Cross-border:		
	<ul style="list-style-type: none"> • Financial interconnections within economies and across border • Capital flows • Spillover analysis • international environment 		

Resilience of the financial system: Data are used to undertake a holistic review of the financial system that is common to financial stability reports. Such reviews encompass not just deposit-takers, but also other financial institutions, and the relationships between them; the structure of the system and concentration measures—not least for assessing the potential impact on competition; the markets in which these institutions, and other debtors and creditors, operate; the infrastructure of the financial system, such as clearing houses; and, particularly for developing countries, financial inclusion.

For deposit-takers, data collected and compiled to support prudential supervision of individual banking institutions remain essential.

Systemic vulnerabilities arising from credit and debt, and asset prices (including leverage, currency, and liquidity): Data on credit and debt are generally considered central to FSA, as research suggests that fast growth in credit can be an early warning indicator of financial crisis,⁴⁷ while liquidity and solvency problems can arise with high levels of debt relative to income and wealth. As customers of the financial sector, data on non-financial corporations (NFC) and households (HH) are used to identify potential problems in these sectors that might cause problems for the financial sector, and vice versa. Due to the inherent risks, data

⁴⁷ For instance, see Mathias Drehmann, “Total credit as an early warning indicator for systemic banking crises,” BIS Quarterly Review, June 2013. See www.bis.org/publ/qtrpdf/r_qt1306f.htm.

on connected, concentrated and/or government directed lending are monitored, while the growth of credit through the FinTech industry is beginning to be assessed where relevant.

Among asset prices, real estate prices, both for residential and commercial property, equity and bond prices, as well as for land are closely monitored because fluctuations in prices affect their use as collateral, directly impact financial wealth and, indirectly impact the economy through the effect on consumer and corporate confidence.⁴⁸ There is also growing interest in volatility measures so as to understand better the uncertainties/risk in financial markets.

Structural vulnerabilities within the financial system arising from financial interconnections and spillovers, both domestic and cross-border: There is an increasing use of data that supports an understanding of financial interconnections and spillovers among individual financial institutions,⁴⁹ the financial and domestic non-financial sectors, and, between each sector and the rest of the world. This is often the most complex area of FSA in that financial connections between different sectors are complicated by second or third round inter-linkages—who lends to the entity funding my position, and by common exposures—I have no relationship to you except the fact that we are both exposed to the same kind of risks. Indeed, vulnerabilities can arise from the complexity of increased interconnectedness as well as from the use of complex, and often opaque, financial instruments.

Also, policies of major economies can potentially have spillover implications for the domestic economy, perhaps through unexpected channels.⁵⁰ Given this, national FSA typically monitors data that helps assess developments in the international environment and the potential impact of capital flows.

Cross-sectional and time-series data

The literature suggests that it is important to distinguish between the cross-sectional and time dimension aspects of FSA. The August 2016 BIS/FSB/IMF G-20 report picks up on this distinction in noting that “systemic risk is generally recognized as having two dimensions: vulnerabilities related to the build-up of risks over time (“time dimension”), and vulnerabilities from interconnectedness and the associated distribution of risk within the financial system at any given point in time (“cross-sectional” or “structural” dimension).” This has an important implication for statistical work in that traditionally economic and financial statistics have been focused on the time dimension rather than cross-sectoral

⁴⁸ When households can borrow against their residential real estate collateral, rising real estate prices can lead to higher borrowing and associated consumption.

⁴⁹ For instance, see “An Empirical Study of the Mexican Banking Systems Network and its Implications for Systemic Risk,” Alexandrova-Kabadjova, Bravo-Benitez, Martinez-Jaramillo, Solórzano-Margain, Banco de Mexico, Working Papers, No. 2012–07. See http://catedrabde.uji.es/naim/images/presentations/banxico_wp.pdf.

⁵⁰ For instance, see “Enhancing Surveillance: Interconnectedness and Clusters.” IMF March 15, 2012. See <https://www.imf.org/external/np/pp/eng/2012/031512.pdf>.

dimension, although the increasing analytical focus and use of position data is beginning to give more emphasis to the latter.^{51 52}

Cross-border consolidated- and residence-based data

The primary interest of the authorities when analyzing financial stability is on the impact on residents⁵³ and the domestic economy, as the ultimate goal of domestic policy makers is to protect the domestic economy. Therefore, the majority of the datasets used by domestic policy makers for FSA are residence-based. This is primarily true for data on credit and debt, financial markets, interest rates, financial market infrastructure and inclusion, and domestic and cross-border inter-connectedness.

Nonetheless, risks to financial stability may come from the activities of domestically-owned individual institutions in foreign markets - the involvement of European banks in the sub-prime market prior to the GFC being a prime example. This implies that cross-border consolidated statistics of domestically-owned individual institutions (incorporating foreign branches and subsidiaries) located in an economy are also relevant for FSA.

Indeed, data for deposit-takers is typically analyzed both for micro- and macro prudential purposes on a cross-border consolidated basis.⁵⁴ For instance, the scope of application under the Basel standards for banking supervision provides that to the greatest extent possible, all banking and other relevant financial activities (both regulated and unregulated) conducted within a group containing an internationally active bank will be captured through consolidation.⁵⁵ Similarly data for FSIs for deposit-takers are typically compiled and analyzed using one of a range of consolidation approaches including those based on the Basel standards.

In this context, there has been the longstanding use of BIS IBS data on a cross-border consolidated basis that captures the nationality of international banking activities, including where the ultimate risk lies. This is because, as noted by Tissot, “the IBS consolidated data

⁵¹ Micro-prudential banking supervision data are collected and analyzed by individual institution often involving the inclusion of foreign affiliates and activities that are ancillary to banking business, focusing on the latest end-period. As macroeconomic statistics have a residence and traditionally time-series focus, supervisory data have developed, and remain largely, separate from, macroeconomic statistics.

⁵² See IMF WP/15/88 “What has Capital Flow Liberalization Meant for Economic and Financial Statistics?,” page 18. <http://www.imf.org/external/pubs/ft/wp/2015/wp1588.pdf>.

⁵³ Residents cover those entities and households that are located—have their center of economic interest, in the domestic economy. This is regardless of ownership or nationality. So, a foreign-owned deposit-taker located in the domestic economy is resident of that economy.

⁵⁴ The concept of consolidation is not as clear as that of residence. Indeed, there are many “varieties” of consolidation. See “Consolidation and corporate groups: an overview of methodological and practical issues.” An Inter-Agency Group on Economic and Financial Statistics (IAG) reference document, October 2015, <http://www.bis.org/ifc/publ/iagrefdoc-oct15.pdf>.

⁵⁵ See “Scope of Application, International Convergence of Capital Measurement and Capital Standards,” BCBS June 2006: www.bis.org/publ/bcbs128.htm.

yield a comprehensive picture of the national lenders' risk exposures, in particular to country risks,"⁵⁶ and so can help identify potential risks and vulnerabilities to the domestic economy arising from the foreign activities of domestically headquartered international banks.

Also, the activities of domestic subsidiaries and branches of foreign deposit-takers can be significant in the host market but relatively small within the context of the consolidated foreign banking group. In such circumstances, the behavior of these foreign affiliates can be affected as much, if not more, by activity, and decisions made, outside as inside the host market—for instance a funding shock to the parent bank or economy. In addition, vulnerabilities of subsidiaries in foreign markets may not be apparent in the home country's residence-based data. These insights were one reason why the recent enhancements to the locational BIS IBS datasets included more granular information by nationality of the reporting bank.⁵⁷ As McGuire and von Peter noted, "in any particular host country, a long or short net cross-border position in a particular currency booked by the offices of foreign banks there may be offset or hedged elsewhere on those banks' global balance sheet."⁵⁸

Nonetheless, deposit-takers residence-based data are used for FSA, not least in terms of analyzing domestic interconnectedness and the relationship between the domestic lending and funding sides of the balance sheet. Indeed, for foreign-owned deposit-takers, the extent to which domestic lending is matched by domestic retail deposits, provides insights into the stability of their lending activity within the economy.⁵⁹

Data for non-bank financial institutions (NBFI) might be analyzed on a cross-border consolidated basis, if the relevant data are available. However, residence-based data are often the only data available. For instance, the FSB annual global shadow banking monitoring report draws heavily on national financial accounts data although it also includes estimates of shadow banking that excludes NBFI that are part of a regulated banking group.

Further, while residence-based data are the basis of analyzing debt and credit, FSA is also increasingly interested in data on borrowing by subsidiaries of resident entities located abroad.⁶⁰ As was seen in the GFC, many countries, particularly emerging market economies (EME), found that borrowing by foreign subsidiaries of domestic NFCs came onto the

⁵⁶ "Globalisation and financial stability risks: is the residency-based approach of the national accounts old-fashioned?" Bruno Tissot.

⁵⁷ See also, "Bank structure, funding risk and the transmission of shocks across countries: concepts and measurement," Ingo Fender, and Patrick McGuire, BIS Quarterly Review, September 2010, http://www.bis.org/publ/qtrpdf/r_qt1009h.pdf and "Toward a global risk map," page 5, BIS Working Papers, No. 309, May 2010, Stephen G. Cecchetti, Ingo Fender, and Patrick McGuire: <http://www.bis.org/publ/work309.htm>.

⁵⁸ See Patrick McGuire and Goetz von Peter, "The US dollar shortage in global banking and the international policy response," BIS Working Papers No. 291, October 2009: www.bis.org/publ/work291.htm.

⁵⁹ For instance, see "The resilience of banks' international operations," Patrick McGuire and Goetz von Peter, BIS Quarterly Review, March 2016. See http://www.bis.org/publ/qtrpdf/r_qt1603g.pdf.

⁶⁰ See the chart "Credit to non-banks including offshore issuance" on page 21 of "Globalisation and financial stability risks: is the residency-based approach of the national accounts old-fashioned?" Bruno Tissot, October 2016.

domestic balance sheet in the crisis. Even outside of a crisis, significant recent U.S dollar borrowing by foreign subsidiaries of emerging market NFCs, often through issuance of debt securities in foreign markets (offshore borrowing), has raised questions of the extent to which they are facing foreign currency risks that might in turn affect the domestic parent (see also the next section under “corporate borrowing”).

IV. WHAT DATA GAPS HAVE EMERGED?

The previous section discussed the data used by national and international authorities in their FSA. While acknowledging the progress that statisticians have made in closing data gaps (see Appendix 2), policy makers at the national and international level have continued to draw attention to specific gaps that they consider need to be addressed. Drawing on these calls, this section sets out the most significant of these needs and suggests a way forward for each.

Before addressing the specific gaps to be filled, some more general observations about the data needed for FSA can be made.

First, from a review of the data used (see Appendix 1) it is evident that many of the needed data are already available to the financial institutions and authorities, although coverage varies across countries. Since the GFC, statisticians have taken a number of initiatives to expand the availability of data for FSA as circumstances have demanded. There have been increased efforts in several fora and significant progress has been made in closing the gaps identified, notably at the international level through the G-20 DGI⁶¹ and the IMF's Special Data Dissemination Standard Plus (SDDS Plus).⁶² While these international initiatives are not relevant for all economies, implementation by countries for which they are relevant would support FSA in a significant way. In an interconnected global economy, the benefits of implementing such initiatives not only accrue for the implementing economy but also for the broader international community.

In particular, the G-20 DGI has promoted work to close gaps and strengthen datasets that support both the monitoring of risk in the financial sector (for example, FSIs, securities issuance, and credit default swaps data), and the monitoring of domestic and cross border risks and vulnerabilities (such as through sectoral balance sheets and the major cross-border surveys of the BIS and IMF) (see Appendix 2 for more details).

Despite these improvements there is often a need for further steps (i.e., enhancements of several datasets in terms of coverage, scope, quality, consistency) including some new data collection initiatives (e.g., collection of new data such as the granular dataset on globally systemically important financial institutions).

⁶¹ For an overview of the progress made under the G-20 DGI, see Annex 3, the Sixth FSB/IMF Progress Report on the G-20 Data Gaps Initiative, <http://www.imf.org/external/np/g20/pdf/2015/6thprogressrep.pdf>.

⁶² The Special Data Dissemination Standard (SDDS) and enhanced-General Data Dissemination System (e-GDDS) can also support the work of FSA. See <http://dsbb.imf.org>.

In addition, there does remain a question as to whether all the available official data are being fully used to meet user needs. Official statisticians may need to do a better job in communicating to policy makers the possibilities of available data. The user may not be aware that the data they need are available either directly, or indirectly through manipulating available data, or that available data have an informational content that is of relevance to FSA.⁶³ One attempt to address this “publicity” issue has been through the Principal Global Indicators (PGI) website set up by the Inter-Agency Group on Economic and Financial Statistics (IAG).⁶⁴

Finally, financial stability policy makers and analysts increasingly use market/private sector data as well as official statistics in their work. This is particularly true for market-related data and high-frequency data. Private sector data can be more timely if less comprehensive. But policy makers often want early indications of emerging risks and vulnerabilities. In this regard, there is also growing interest in big data as they can provide timely data at a high speed. In other words, official statistics do not, and do not need to try to, meet all the FSA data needs.

Specific Data Gaps

Shadow banking

While the banking sector has traditionally been at the heart of the financial sector, the GFC demonstrated the key role shadow banking financial institutions and markets play in credit and maturity transformation, performing bank-like activities.⁶⁵ However, unlike deposit takers, these institutions are usually not strictly regulated and supervised, and have no access to deposit insurance, to the rediscount operations, or to the last resort credit lines of central banks.⁶⁶

As has been emphasized by the FSB, the IMF, and other international and national authorities, there is a need for data that identifies and estimates the scale of shadow banking activity, provides a better understanding of both the entities involved and the risks they are

⁶³ For example, the build-up of European investments in U.S. securities during the middle years of the 2000s was clearly evident in the Coordinated Portfolio Investment Survey data but was not picked up by analysts. See “Data Provision to the IMF for Surveillance Purposes,” Pedro Rodriguez, IMF, BOPCOM-08/28. <http://www.imf.org/external/pubs/ft/bop/2008/08-28.pdf>.

⁶⁴ See <http://www.principalglobalindicators.org/?sk=E30FAADE-77D0-4F8E-953C-C48DD9D14735> The members of the IAG are senior statisticians from the BIS, the European Central Bank (ECB), Eurostat, the IMF, the Organization for Economic Cooperation and Development (OECD), the United Nations (UN), and the World Bank.

⁶⁵ Measures of shadow banking activity include by type of non-bank financial, and/or through the value of activity through securitization, repos, money market funds, bankers’ acceptances and commercial paper. The former is more typically used but see also the 2014 Canada FSAP, page 10, <http://www.imf.org/external/pubs/ft/scr/2014/cr1429.pdf>.

⁶⁶ See Maryse Farhi and Marcos Antonio Macedo Cintra 2009, “The Financial Crisis and the Global Shadow Banking System,” <https://regulation.revues.org/7473?lang=en#ftn1>.

facing, and can indicate potential vulnerabilities to the financial system arising from their activities. In doing so, the relationship with the banking industry can be assessed along with the risks to financial stability arising from shadow banking activities.

Experience during the GFC has shown that risks to financial stability may emerge in these institutions and markets from high leverage, maturity mismatches, and/or illiquidity, materialization of which could spread through the whole financial system. An example was the experience of money market funds (MMFs).⁶⁷ While not typically leveraged institutions, the GFC illustrated how rapidly the risks and vulnerabilities of MMFs can be transmitted to the rest of the financial system when investors start withdrawing their funds on a significant scale: MMFs liquidated financial assets so helping to depress market prices and scaled back their wholesale funding of deposit-takers, particularly to European banks.⁶⁸

This has led policy makers to adopt stricter regulatory oversight on shadow banking institutions and markets, including, greater disclosure on asset valuations and collateral haircuts, reforms of governance and ownership, as well as stricter oversight, regulation and limitations on collateral lending.⁶⁹ The FSB has led the work at the international level, producing an annual monitoring report using available data (as well as addressing the regulatory aspects of shadow banking).⁷⁰

Unlike the detailed information available to the supervisors and central banks for the monitoring of the banking sector, data on shadow banking has generally been lacking due to the heterogeneous nature of the institutions, lack of regulatory oversight, a previous lack of recognition of the systemic importance of shadow banking, and a lack of a consistent definition of shadow banking.

In its May 2016 Financial Stability Review (FSR),⁷¹ the ECB pointed out the limited availability of disaggregated data needed for FSA on assets, liabilities, capital, and profitability of financial institutions other than deposit-takers and insurance companies.

⁶⁷ MMFs invest in short-term assets and offer redemptions on demand. So traditionally MMFs have been considered an alternative to bank deposits.

⁶⁸ See IMF *Global Financial Stability Report*, Chapter 2: “Shadow Banking Around the Globe: How Large, and How Risky?” October 2014. <https://www.imf.org/external/pubs/ft/gfsr/2014/02/pdf/c2.pdf>.

⁶⁹ See FSB, “Strengthening Oversight and Regulation of Shadow Banking: Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos,” August 2013. See http://www.fsb.org/wp-content/uploads/r_130829b.pdf.

⁷⁰ At the 2010 Summit meeting in Seoul, the G-20 Leaders tasked the FSB to undertake a major initiative to monitor the activity, and review the regulation, of shadow banks. See <http://www.g20.utoronto.ca/2010/g20seoul-doc.html>.

⁷¹ See ECB Financial Stability Review, May 2016, <https://www.ecb.europa.eu/pub/pdf/other/financialstabilityreview201605.en.pdf?e1a2bef79ed901d8ceae004f2fcecdd>.

Eichner, Kohn and Palumbo⁷² pointed out that the growth of maturity transformation outside the traditional banking sector contributed to the severity of the financial crisis but was not conveyed in aggregate financial statistics for the U.S. economy.⁷³

In addition, there is a lack of data with regard to securities financing activities for FSA considering the reliance of shadow banking institutions on wholesale funding (such as through repo and securities lending markets). For instance, the importance of closing the data gaps in securities financing markets was pointed out by the U.S. Financial Stability Oversight Committee (FSOC)⁷⁴ emphasizing that data are needed to assist policy makers' understanding of (1) how the repo market operates; (2) the interdependencies of institutions and participants; and (3) changes in risk characteristics, such as collateral and haircuts.

At present, existing balance sheet and other relevant data are collected, in most cases, under jurisdictions' existing statistical (and regulatory) reporting requirements, with the level of granularity and frequency of reporting varying across entity types within and across jurisdictions.⁷⁵ Data gaps are particularly prominent for non-regulated entities for whom the national authorities' data collection powers often do not extend.

While the national accounts-based sectoral balance sheet and flow of funds data provide a good initial basis for assessment of the shadow banking risks, there are a number of limitations that require addressing either through methodological developments (see next section) or new data collections. In particular, data by economic function, with more granular information on maturity and liquidity transformation, and foreign currency exposures, is needed to support the risk metrics used for assessing the extent of shadow banking risks. To have a full picture of the risks and vulnerabilities associated with NBFIs, including a thorough analysis of their cross-border linkages, cross-border consolidated data on a nationality basis are needed to complement the currently available residency-based data.

The FSB sees the need for granular data on shadow banking entities on an economic functions basis, inter alia covering leverage, liquidity, and maturity transformation activities,

⁷² See Eichner, Kohn and Palumbo, 2010, "Financial Statistics for the United States and the Crisis: What did they get right, what did they miss and how should they change?" Federal Reserve Board, Finance and Economics Discussion Series, <https://www.federalreserve.gov/pubs/feds/2010/201020/201020pap.pdf>

⁷³ The IMF, in GFSR October 2016, also highlights the increasing importance of non-bank financial institutions in the transmission of monetary policy as the risk-taking channel of monetary policy has gained importance and asset managers have assumed a greater role in financial intermediation. In this context, IMF points out that given the growth of the non-bank financial sector, the information contained in the balance sheets of non-banks is potentially at least as useful as traditional measures of monetary aggregates.

⁷⁴ U.S. FSOC 2016 Annual Report, <https://www.treasury.gov/initiatives/fsoc/studies-reports/Pages/2016-Annual-Report.aspx>

⁷⁵ See FSB May 2016 "Thematic Review on the Implementation of the FSB Policy Framework for Shadow Banking Entities" <http://www.fsb.org/wp-content/uploads/Shadow-banking-peer-review.pdf>

currency mismatches, and credit intermediation activities.⁷⁶ In addition, the FSB is working to develop a regular flow of data on securities financing markets at the national and global levels by end-2018, that will shed light into the size, composition, pricing, and risk profile of these markets.⁷⁷

Suggested way forward

To contribute to the global efforts to improve the availability of data on the shadow banking sector, it is important for statisticians, regulators, and other users to share experiences in compiling and analyzing shadow banking data, including on ways to ensure comprehensive coverage and avoid duplication of effort. In addition, frequent dissemination of data would facilitate the timely assessment of the shadow banking system and its linkages with the rest of the financial system, and hence provide a better assessment of the systemic risks associated with shadow banking institutions and markets.

The FSB's efforts to improve the availability of information are key⁷⁸ and to this end the FSB has set up a Shadow Banking Experts Group that shares national and regional experiences in compiling and analyzing shadow banking data in the context of the FSB's annual global shadow banking monitoring report. Further, the FSB-led work on securities financing markets will provide important information on markets in which shadow banking institutions operate. Also, the IAG Working Group on Institutional Sector Accounts is currently working on better capturing shadow banking activity using macro-economic based data, by exploring the possibility of capturing more granular sub-sectoral breakdowns and instruments (see next section) for the non-bank financial sector. All this work is endorsed by the second phase of the DGI (DGI-2) Recommendation 5 on shadow banking.

Assessment of capital flows

During the past years, there has been an increased policy interest in the financial stability policy implications of large swings in international capital flows. While the freer flow of capital is considered to have significant benefits for domestic economies including by enhancing efficiency, promoting financial sector competitiveness, and facilitating productive investment and consumption smoothing, the potential risks associated with the swings in capital flows need to be closely assessed as financial interconnectedness associated with

⁷⁶ FSB Global Shadow Banking Monitoring Report 2015, <http://www.fsb.org/wp-content/uploads/global-shadow-banking-monitoring-report-2015.pdf>.

⁷⁷ In the EU, in 2016 a regulation requiring the reporting of securities transactions to a trade repository (TR) came into effect to improve the transparency of these markets. In the US, the OFR and Federal Reserve launched a pilot project to fill gaps in data on bilateral repo and securities markets. A pilot project on securities financing activities was also conducted in Japan.

⁷⁸ The March 18, 2017 communique of the G-20 Finance Ministers and Central Bank Governors asked "the FSB to present by the Leaders Summit in July 2017 its assessment of the adequacy of the monitoring and policy tools available to address such risks from shadow banking."

greater capital flows can exacerbate the transmission and spillover of shocks between economies.⁷⁹

In 2016, the BIS and IMF reported to the G-20 their assessments of the effects of capital flow volatility with a particular emphasis on data needs.⁸⁰ Both the IMF and the BIS recognized the Balance of Payments (BoP) as a key source of information on cross-border capital flows but identified data gaps that need to be addressed to order to obtain a detailed picture of capital flows. These included:

- More timely BoP data (shorter reporting lag) with a higher frequency of indicators to assess capital flows.
- Identification of the direction of flows between individual countries or groups of countries, e.g., capital flows to advanced economies both from other advanced economies and emerging market and developing economies (and similarly for capital flows to emerging market and developing economies).
- Separation of the flows associated with non-financial corporate activity from those of the financial sector in the BoP. In DGI-2 the possibility of separate identification of NFCs is being investigated.
- Need for an increase in the number of countries disseminating the breakdown of direct investment data by geographical location, sector and currency. In DGI-2, inward and outward investment by country is promoted through the IMF Coordinated Direct Investment Survey (CDIS).
- Need for an increase in the number of countries disseminating the breakdown portfolio investment asset and liability data by the geographical location of debtors/creditors and by currency. Under DGI-2 sector breakdowns within the CPIS are being promoted, with a move to quarterly reporting by 2019.

⁷⁹ IMF Note to the G-20, April 2016 “Recent Experiences in Managing Capital Flows” http://g20chn.org/English/Documents/Current/201608/t20160811_3127.html. Inter alia, the note points out that during 2009 and 2015, four main capital flow episodes were observed with changes in net capital flows of about 3–5 percent of the GDP on average.

⁸⁰ The IMF presented notes to the G-20, in February and June 2016. The BIS was presented in August 2016. Both notes are available at <http://www.g20chn.org/English/Documents/Current/index.html>. The March 18, 2017 communique of the G-20 Finance Ministers supported “continuing to enhance the monitoring of capital flows and management of risks stemming from excessive capital flow volatility.”

- External balance sheet data on currency composition, remaining maturity of debt, and off-balance sheet items such as contingent assets and liabilities, guarantees and lines of credit, and hedging using financial derivatives.⁸¹

Further, the G-20 International Financial Architecture (IFA) Working Group in their 2016 Final Report underlined the importance of enhancing capital flows and stocks data collection to better identify currency and maturity mismatches, while also explicitly supporting the recommendations in the G-20 DGI that support capital flow analysis.⁸² Also, in late 2016 the IMF published a paper on “Capital Flows—Review of Experience with the Institutional View” that considered improving capital flows data a priority with a focus on the timeliness, scope and granularity of balance of payments data.⁸³ Also highlighted was the importance of more detailed balance sheet (by sector and foreign currency exposure) and off-balance sheet data (such as contingent liabilities and derivative transactions).⁸⁴

Suggested way forward

There is considerable data available on cross-border positions and flows. A holistic review of cross-border exposures data could be undertaken by the IMF Committee on Balance of Payments Statistics (BOPCOM) to see how these data could be leveraged to best meet policy makers’ needs.

In addition, data from the G-SIBs common data template that covers these institutions exposures to national markets and sectors (see Appendix 2) could be aggregated to provide an early indication of cross-border capital flows from the largest global banks. Further the template could be used by a broader range of national authorities to collect granular information on national banking systems exposures and funding dependencies. Such data would shed light on flows to and among EMEs.

⁸¹ Complex measurement issues are raised when attempting to measure the hedging of exposures through financial derivatives, not least because the market value of financial derivatives does not equate to exposures, and for multinational companies hedges may be undertaken at the group level.

⁸² The *Final Report* is available at www.g20.utoronto.ca/2016/P020160815362591309719.pdf.

⁸³ The paper also called for a reduction in reporting lags and an increase in frequency. See <https://www.imf.org/external/np/pp/eng/2016/110416a.pdf>.

⁸⁴ With regard to contingent liabilities, Chapter 9 of the 2013 *External Debt Statistics Guide* discusses the statistical measurement of such liabilities, and includes presentation tables that present inward and outward risk transfers through contingent liabilities.

Corporate borrowing

Since the GFC borrowing by NFCs, particularly in EMEs, has increased significantly, as highlighted by BIS research that has drawn on a BIS database of total credit to NFCs.^{85 86} These data show that NFC debt in the major EMEs increased from less than 60 percent of GDP in 2006 to 110 percent at end-2015. Further, the BIS research points out that any analysis of the vulnerability of EME debtors to foreign currency exposures must take account of leverage, debt maturity, and the external/domestic distinction of debt. Against this background, specific data gaps for NFCs include (i) foreign currency borrowing, particularly through off-shore affiliates; and (ii) information on corporates' risk exposures, such as maturity mismatches and foreign currency exposures (including hedging activities).

Regarding NFCs' foreign currency borrowing, the BIS international debt securities (IDS) database provides comprehensive information on total issuance of international debt securities, with currency and maturity breakdowns. But there is a lack of data on NFCs offshore foreign currency borrowing from deposit-takers as noted in the August 2016 BIS note to the G-20 IFA Working Group.⁸⁷

The BIS IDS database highlights the scale of off-shore borrowing in debt securities. As of September 2015, offshore borrowing accounted for a significant amount of total (including offshore) borrowing through international debt securities by Chinese (93 percent), Brazilian (53 percent), and Russian (45 percent) nationality NFCs. As noted by the Bank of England (BoE)⁸⁸ this offshore borrowing by NFCs with a global presence cuts across traditional residence-based data either, as BIS explains, not showing up in residence-based external debt statistics (when proceeds are not repatriated) or classified as foreign direct investment (FDI) flows (when repatriated). In either case, residence-based measures could paint an overly benign picture of vulnerabilities⁸⁹ and does not capture all the potential financial stability risks facing a country.

⁸⁵ See Michael Chui, Emese Kuruc, and Philip Turner "A new dimension to currency mismatches in the emerging markets: nonfinancial companies", BIS Working Papers, No. 550, March 2016, <http://www.bis.org/publ/work550.pdf>.

⁸⁶ Credit is measured as loan, debt security, and currency and deposit liabilities to domestic banks, all domestic sectors, and nonresidents. See Christian Dembiermont, Mathias Drehmann, and Siriporn Muksakunratana "How much does the private sector really borrow—a new database for total credit to the private non-financial sector," BIS Quarterly Review March 2013. http://www.bis.org/publ/qtrpdf/r_qt1303h.pdf.

⁸⁷ See page 15 in "International capital flows and financial vulnerabilities in emerging market economies: analysis and data gaps," Nikola Tarashev, Stefan Avdjiev, and Ben Cohen, BIS note submitted to the G-20 International Financial Architecture Working Group, August 2016, <http://www.bis.org/publ/othp25.pdf>.

⁸⁸ See Bank of England Financial Stability Paper 40, 2016, "Capital inflows—the good, the bad and the bubbly," Glenn Hoggarth, Carsten Jung, and Dennis Reinhardt http://www.bankofengland.co.uk/financialstability/Documents/fpc/fspapers/fs_paper40.pdf.

⁸⁹ See Branimir Gručić and Philip Wooldridge, "What does the sectoral classification of offshore affiliates tell us about risks?" December 2014, http://www.bis.org/publ/qtrpdf/r_qt1412b.pdf

In addition to cross-border foreign currency borrowing by NFCs in international debt securities, domestic foreign currency borrowing, e.g., from domestic deposit-takers, also needs to be assessed as this form of borrowing also exposes NFCs, and through the NFCs, the domestic deposit-takers, to foreign exchange risks.

Consistent information on off-balance sheet activities, such as contingent assets and liabilities, guarantees and lines of credit, and hedging using financial derivatives also remain data gaps. While countries, at the national level, generate some information based on different data sources, through surveys or through information from derivatives exchanges, lack of consistency in the coverage and definitions used across jurisdictions does not allow for meaningful aggregation at an international level.⁹⁰

Also, the August 2016 BIS note to the G-20 IFA Working Group points out that there is no international database on NFCs financial assets including currency and maturity composition as well as on the country and sector of their counterparty debtors.

According to the BIS, the lack of information contributes to the uncertainty about NFCs volume of foreign currency exposures, the links with the banking system, and the degree to which hedging reduces systemic risk.

Suggested way forward

Recommendation 14 of DGI-2 asks the IAG to improve the consistency and dissemination of data on NFCs' cross-border exposures, including those through foreign affiliates and intra-group funding, to better analyze the risks and vulnerabilities arising from such exposures including foreign currency mismatches.

The BIS note to the G-20 IFA Working Group suggested that in the short term combining the residence-based BoP data with the BIS IBS and IDS could shed more light on NFCs cross-border exposures and their evolution. The IAG document produced for the DGI also sets out some ideas for further work with regard to capturing NFCs cross-border exposures.⁹¹

As also emphasized by the BIS, enhanced disclosures of financial hedges and derivatives positions (including detailed currency and maturity information on financial hedges and their underlying positions) on a timely basis through improved accounting standards could also contribute to the availability of consistent information on the risk exposures of NFC.

⁹⁰ See BIS 2014 "Summary: Joint CGFS – FSB-SCAV workshop on risks from currency mismatches and leverage on corporate balance sheets," http://www.fsb.org/wp-content/uploads/r_140923a.pdf.

⁹¹ See IAG reference document: "Consolidation and corporate groups: an overview of methodological and practical issues," October 2015, <http://www.bis.org/ifc/publ/iagrefdoc-oct15.pdf>.

Granular and micro-data

With the nature of financial stability risks changing over time, FSA needs to be sufficiently flexible to address shifting vulnerabilities. As Jenkinson and Leonova⁹² emphasized, given the increasing focus of financial stability on the risks to the financial system as a whole, new approaches to financial data based on the uniform representation and standardization of its key elements is becoming more important to allow for flexible data aggregation to support multiple policy objectives.

To this end, detailed and granular information is increasingly being requested to contribute to the flexibility of FSA tools.⁹³ Several statistical initiatives mentioned in this paper aim to increase the granularity of available information (e.g., the common data template on G-SIBs', data on repo and securities financing transaction, enhanced BIS IBS data, sectoral balance sheets, and the enhanced IMF CPIS). There is particular emphasis on the sector, country, and currency dimensions of both creditor and debtor positions, all of which are important to FSA.

If shared, granular data would allow statistical compilers to identify, and resolve inconsistencies between data compiled in different institutions and in different countries, while possibly reducing the burden for the data reporters. In addition, as the policy makers' data needs change, through the availability of granular data, statistical agencies could compile aggregates in ways that meet these changing needs without sending data requests to data reporters.⁹⁴

To meet the need for increased availability of granular data not only could the collection of more granular data be considered but more use could be made of existing micro data (data that are collected for supervisory or micro-prudential purposes). In this context, the development of principles for effective risk data aggregation and risk reporting by the Basel Committee on Banking Supervision (BCBS),⁹⁵ the creation of a common data template for G-SIBs to include bi-lateral exposures and exposures to countries/sectors/instruments, and

⁹² Nigel Jenkinson and Irina Leonova, Financial Stability Review, Banque De France, No. 17, 2013, "The importance of data quality for effective financial stability policies, Legal entity identifier: a first step towards necessary financial data reforms," https://papers.ssrn.com/sol3/papers2.cfm?abstract_id=2538229.

⁹³ For instance, in the 2015 FSR of the Deutsche Bundesbank (https://www.bundesbank.de/Redaktion/EN/Downloads/Publications/Financial_Stability_Review/2015_financial_stability_review.pdf?__blob=publicationFile), the importance was stressed of granular loan-level data to facilitate risk analysis, including allowing a better assessment of systemic risks stemming from residential property loans, and, where appropriate, for macro-prudential instrument calibration purposes.

⁹⁴ Charlie Bean underlines the benefits of granular data from the perspective of UK statistics in his report "Independent review of UK economic and financial statistics", March 2016 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/507081/2904936_Bean_Review_Web_Accessible.pdf.

⁹⁵ BCBS, 2012, "Principles for effective risk data aggregation and risk reporting" <http://www.bis.org/publ/bcbs239.pdf>.

the development of a legal entity identifier system (LEI),⁹⁶ to identify unique parties to financial transactions are all relevant.

Other initiatives to strengthen financial institutions' risk reporting practices include data reporting requirements arising from the implementation of Basel III⁹⁷ and the Solvency II rules; the development of recovery and resolution plans by national banking groups; and the efforts to enhance international financial reporting standards.⁹⁸ In addition to contributing to financial institutions' own risk managements, the improvements in regulatory reporting can contribute to the quality of the more aggregate macro-prudential data for the assessment of system-wide financial stability risks at the national, regional, and international levels.

However, the use of micro data for macro financial assessment has its challenges, the most important being the strict confidentiality requirements associated with the use of micro data. Such requirements typically limit data sharing among statistical and supervisory agencies, and with users. But also granular information brings data quality and consistency issues that need to be dealt with to be able to draw appropriate conclusions for macro-prudential analysis. Tissot points out the importance of being able to aggregate micro information so it can be analyzed, and communicated to policy makers while on the other hand the “macro” picture on its own can be misleading, as it may mask micro fragilities that have system-wide implications.⁹⁹

Macro-stress testing is a key tool to assess the resilience of financial institutions and sectors to shocks and would benefit from more detailed information particularly for the top-down stress tests.

Suggested way forward

Work is ongoing as part of Recommendation 20 of DGI-2 to promote the sharing of data within jurisdictions and with other national authorities.¹⁰⁰ However, given the differences in legal, statistical structures and cultural backgrounds across jurisdictions, enhancing data sharing is a challenging task and cannot be accomplished overnight. Going forward,

⁹⁶ For more information on the Legal Entity Identifier (LEI) see <http://www.fsb.org/what-we-do/policy-development/additional-policy-areas/legalentityidentifier/>.

⁹⁷ Under Basel III, Pillar III aims to promote market discipline through enhanced regulatory disclosure requirements. See "Revised Pillar 3 disclosure requirements," BCBS, January 2015 <http://www.bis.org/bcbs/publ/d309.pdf>.

⁹⁸ See “Principles for effective risk data aggregation and risk reporting,” BCBS

⁹⁹ See Tissot, Bruno, “Closing information gaps at the global level—what micro data can bring,” https://www.bis.org/ifc/events/ws_micro_macro/tissot_paper.pdf.

¹⁰⁰ In their March 18, 2017 communiqué, the G-20 Finance Ministers stated that they “welcome the recommendations of the IAG for sharing and accessibility of granular data.” The recommendations are set out in the IAG data sharing report on the PGI website (IAG documents). See “Update on the Data Gaps Initiative and the Outcome of the Workshop on Data Sharing.”

international organizations (IOs) should continue their facilitator role by creating platforms to exchange experiences and to help the building of trust.

Real Estate Markets

Considering the potential direct and indirect effects on the stability of the financial system, as demonstrated during the GFC, national and regional authorities are placing increasing emphasis on the monitoring of real estate markets.

Significant improvements have been made by national authorities since the GFC in both the scope and coverage of data on residential and commercial real estate markets. This improvement has been promoted in particular through the support of the DGI, the BIS public property price statistics database, and the inclusion of residential property price index (RPPI) among the core FSIs. Residential real estate prices are also an item in the SDDS Plus.

Despite the progress in the number of economies disseminating real estate price indices, the datasets on residential and commercial property prices vary in terms of quality and coverage. For the residential property prices, given the availability of conceptual guidance,¹⁰¹ the situation is relatively well covered by the BIS database, with wide country coverage, some consistency of data, and, for several advanced and emerging economies, with long-time series data. But the geographical and type of property coverage varies significantly among countries. As regards commercial property prices, their coverage in the BIS public property price statistics database has been expanding significantly since 2016 in the context of the DGI-2, although data are currently available from only a few number of countries with differing frequencies and scopes (e.g., in terms of type of property, area covered, compilation method).

Against this background, the need to improve the quality and availability of data on real estate markets has been emphasized in the Financial Stability Reviews of many economies.¹⁰² In November 2016, the European Systemic Risk Board (ESRB) published a recommendation¹⁰³ on closing data gaps for residential and commercial real estate markets, underscoring the significance of developments in the real estate sector for financial stability and the considerable data gaps that continue to exist in this area. The aim is to establish a more harmonized framework for monitoring developments in real estate markets in the

¹⁰¹ See *Handbook on Real Estate Price Statistics*
<http://ec.europa.eu/eurostat/product?lang=en&mode=view&code=KS-RA-12-022>.

¹⁰² The ECB in its May 2016 Financial Stability Review (<https://www.ecb.europa.eu/pub/pdf/other/financialstabilityreview201605.en.pdf>) focused on the limited coverage of existing price indicators focusing on prime commercial property in large cities. The Central Bank of Ireland, in its December 2016 Macro-Financial Review, also indicated the need for comprehensive and independent information on the commercial real estate sector including data on stock, sales, leases and planning (<http://www.centralbank.ie/stability/Pages/Introduction.aspx>). Australian, German and Canadian authorities have highlighted the need for improved information on the housing market.

¹⁰³ <https://www.esrb.europa.eu/news/pr/date/2016/html/pr161128.en.html>.

European Union. The recommendation sets out a common set of indicators that national macro-prudential authorities are recommended to monitor along with working definitions of these indicators.

Finally, in addition to the price indices, there is an FSA need for additional housing-related indicators to complement the price indices.

Suggested way forward

At the international level, guidance has been provided on the compilation of RPPI, while for Commercial Property Prices Indices (CPPI), conceptual guidance is in early stages of development.¹⁰⁴ Going forward, national efforts are key to ensuring the availability of consistent data on property prices, and other indicators of the property market.

Under Recommendation 17 of DGI-2, the Inter-Secretariat Working Group on Price Statistics (ISWGPS), led by the OECD, and in collaboration with the IAG, is developing a list of other housing-related indicators, such as price-to-rent and price to income ratios.

Insurance companies

As emphasized in the IMF April 2016 *GFSR*,¹⁰⁵ before the GFC insurance companies were not thought to pose significant systemic risks having longer-term liabilities, greater diversification of assets, and less extensive interconnections with the rest of the financial system than deposit-takers. However, the near-collapse of the AIG in 2008 revealed the potential systemic risks that could be associated with large insurance companies. As a consequence, the International Association of Insurance Supervisors (IAIS) has identified G-SIIs whose distress or disorderly failure would cause significant disruption to the global financial system and for whom additional capital surcharges are scheduled to be applied starting in 2022.¹⁰⁶

While there is more comprehensive data on insurance companies available from micro and supervisory data sources compared to other non-bank financial institutions, data gaps (such as information on liability structures) still remain, addressing of which would allow for more

¹⁰⁴ The ISWGPS is expected to provide an overview of methods for compiling CPPI-data with the publication of “Commercial Property Price Indicators: Sources, Methods and Issues.” See https://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.22/2016/Eurostat_commercial_property_price.pdf.

¹⁰⁵ See IMF *GFSR* April 2016, Chapter 3: “The Insurance Sector—Trends and Systemic Risk Implications,” <http://www.imf.org/external/pubs/ft/gfsr/2016/01/>.

¹⁰⁶ See IAIS 2016 list of G-SIIs, <http://www.fsb.org/2016/11/fsb-publishes-2016-g-sii-list/> and “IAIS Announces Systemic Risk Assessment and Policy Workplan,” February 2017.

complete risk assessments.¹⁰⁷ In this context, the April 2016 *GFSR* emphasizes that while progress is being made on the micro side, there needs to be a greater macro-prudential focus.

Enhancements to insurance sector data would include better data on common exposures, on interconnections with other financial institutions including cross-border, on the duration gap between assets and liabilities, and on the structure of liabilities including for life insurance companies the relative size of minimum guaranteed products¹⁰⁸ and variable annuities within total liabilities.

Suggested way forward

Under Recommendation 4 of DGI-2 the FSB, in close consultation with the IMF and IAIS, is to consider the possibility of a common data template for G-SIIs. As with the G-SIBs common data template, developing such a template and the subsequent collection of systematic granular information could be challenging, although the work would benefit from the experiences with G-SIBs. Depending upon the outcome of this initiative, in the long-term collection of granular information using the template could be considered including more widely by the regulators for domestic and non-systemic insurers.

Households

Another area where better data are needed to assess financial stability risks is related to the monitoring of the household sector.¹⁰⁹ Such data include comprehensive information on the composition of assets and liabilities, and household income and debt service payments.¹¹⁰ Further, the growing interest of policy makers in the inequality gap (i.e., of consumption, saving, income and wealth) has led to a demand for distributional information.

Suggested way forward

Countries could share their experiences in the compilation of household data including as part of their sectoral accounts statistics. While household surveys are key data sources to provide structured information, they are costly to conduct therefore could be complemented with administrative data to the extent that the confidentiality restrictions allow.

¹⁰⁷ In recent Financial Stability Reviews, the ECB, U.S., and Australia place emphasis on the need for additional data on insurance companies.

¹⁰⁸ Such as investment-oriented life insurance policies.

¹⁰⁹ The importance of the development of a comprehensive dataset on the assets and liabilities of the household sector was emphasized by the IMF in Argentina's 2016 FSAP.

¹¹⁰ The BIS publishes a database of debt servicing ratios, defined as interest payments plus amortizations (repayments of principal) to income, for the total private non-financial sector for 32 countries from 1999 onwards. http://www.bis.org/publ/qtrpdf/r_qt1509h.htm.

As part of Recommendation 9 of DGI-2, the OECD, in cooperation with Eurostat and the ECB, is working with G-20 economies to encourage the production and dissemination of distributional information on income, consumption, saving, and wealth, for the household sector based on the sectoral accounts framework.

Figure 2. Key Data Gaps and the Suggested Way to Close Them

Key Data Gaps	Suggested way forward
Shadow Banking	
<ul style="list-style-type: none"> ● Lack of data due to heterogeneous nature of the institutions, lack of regulatory oversight, a previously lack of recognition of the systemic importance of the shadow banking system, and a lack of consistent definition. ● Sectoral balance sheets and flow of funds data provide a good initial basis but a number of limitations remain. ● Data by economic function, with more granular information on maturity and liquidity transformation, and currency mismatches is needed. 	<ul style="list-style-type: none"> ● FSB's efforts to improve availability of information as part of its annual monitoring report is key. ● The IAG Working Group on Institutional Sector Accounts is currently working on better capturing shadow banking activity using macro-economic based data, by exploring the possibility of capturing more granular sub-sectoral breakdowns and instruments (for the non-bank financial sector). ● It is important for statisticians, regulators, and other users to share experiences in compiling and analyzing shadow banking data, including on ways to ensure comprehensive coverage and avoid duplication of effort. ● Frequent dissemination of data would facilitate the timely assessment of the shadow banking system and its linkages with the rest of the financial system.
Capital Flows	
<p>BIS, IMF and IFA Group assessments of the effects of capital flow volatility presented to the G-20 in 2016 include:</p> <ul style="list-style-type: none"> ● BoP a key source of information but for a detailed picture of capital flows, particularly regarding country and currency dimensions, some data gaps need to be addressed. ● Provide more timely BoP data with a higher frequency of indicators to assess capital flows. ● Separating the flows associated with non-financial corporate activity from those of the financial sector in the BoP. ● Identify the direction of flows between individual countries or groups of countries. ● Increasing the number of countries disseminating the breakdown of direct investment data by geographical location, sector and currency, as well as the breakdown of portfolio investment asset and liability data by geographical location. ● Provide external balance sheet data on currency composition and remaining maturity of capital flows. 	<ul style="list-style-type: none"> ● A holistic review of cross-border exposures could be undertaken by the IMF BOPCOM to see how these data could be leveraged to best meet policy makers' needs. ● Data from the G-SIBs common data template that covers these institutions exposures to national markets and sectors could be aggregated to provide an early indication of cross-border capital flows from the largest global banks. ● Further the G-SIBs template could be used by a broader range of national authorities to collect granular information on national banking systems exposures and funding dependencies.

Corporate Borrowing	
<ul style="list-style-type: none"> ● Significant increase in offshore borrowing by NFCs, particularly in EMEs. Cuts across resident-based data. ● Specific data gaps for NFCs include: (i) foreign currency borrowing, particularly through off-shore affiliates; and (ii) information on corporates' risk exposures (including hedging activities). ● Analysis of the vulnerability of EMEs debtors to foreign currency exposures must take account of leverage, debt maturity, and the external/domestic distinction of debt. ● Regarding NFCs' foreign currency borrowing, BIS international debt securities database provides comprehensive information on total issuance, with currency and maturity breakdowns. But there is a lack of data on NFCs off-shore foreign currency borrowing from deposit-takers, while domestic foreign currency borrowing also needs to be assessed. 	<ul style="list-style-type: none"> ● The BIS suggestion to combine the residence-based BoP data with the BIS IBS and IDS to shed more light on NFCs cross-border exposures and their evolution. ● The IAG reference document on "Consolidation and corporate groups: an overview of methodological and practical issues" (2015) provides some ideas for further work with regard to capturing NFCs cross-border exposures. ● Enhanced disclosures of financial hedges and derivatives positions (including detailed currency and maturity information on financial hedges and their underlying positions) through improved accounting standards could also contribute to the availability of consistent information on the risk exposures of NFCs.
Granular data	
<ul style="list-style-type: none"> ● Detailed and granular information is increasingly being requested to contribute to the flexibility of FSA tools. ● The use of micro data for macro financial assessment has its challenges, including strict confidentiality requirements, and data quality and consistency issues. ● Macro-stress testing is a key tool to assess the resilience of financial institutions and sectors to shocks and would benefit from more detailed information. ● Availability and sharing of granular and micro data would allow compilers to identify and resolve inconsistencies. 	<ul style="list-style-type: none"> ● Given the differences in legal, statistical structures and cultural backgrounds across jurisdictions, enhancing data sharing is a challenging task and cannot be accomplished overnight. ● Going forward, international organizations should continue their facilitator role by creating platforms to exchange experiences and to help the building of trust.
Other Gaps	Way Forward
Real Estate Markets	
<ul style="list-style-type: none"> ● The datasets on residential and commercial property prices vary in terms of quality and coverage. 	<ul style="list-style-type: none"> ● National efforts are key to ensuring the availability of consistent data on property prices, and other indicators of the property market. Work under the recommendation 17 of DGI-2.
Insurance companies	
<ul style="list-style-type: none"> ● Enhancements to insurance sector data would include better data on common exposures, on interconnections with other financial institutions including cross-border, on the duration gap between assets and liabilities, and the structure of liabilities including for life insurance companies the relative size of minimum guaranteed products and variable annuities within total liabilities. 	<ul style="list-style-type: none"> ● Under recommendation 4 of DGI-2 the FSB, in close consultation with the IMF and IAIS, is to consider the possibility of a common data template for G-SIIs.
Households	
<ul style="list-style-type: none"> ● Such data include comprehensive information on the composition of assets and liabilities, and household income and debt service payments. 	<ul style="list-style-type: none"> ● Recommendations 8 (sectoral accounts statistics) and 9 (distributional information) of DGI-2.

V. HOW CAN FSA DATA NEEDS BE ADDRESSED IN ECONOMIC AND FINANCIAL STATISTICAL MANUALS?

While the FSA data needs identified cover a wide range of data series, and the previous section discussed the data gaps that are requested be filled, the question arises as to whether there are common themes in the data needed for FSA that could be met through adaptations of the *System of National Accounts* (SNA), BoP and related manuals (macroeconomic statistical manuals).¹¹¹ The authors believe that such common themes do exist and so advocates a discussion on how the national accounts framework might be best developed to help meet the needs of FSA in the upcoming review of the manuals, likely to start later this decade.

The paper makes this call for three main reasons:

- Since the last update round in the 2000s there has been a much-increased policy focus on financial stability, and it is the purpose of each update round to take account of economic and financial developments, and the consequential needs of policy makers, that have inevitably occurred since the last round;
- the macroeconomic statistical manuals have a central role in the production of economic and financial statistics at national and international statistical offices, with the SNA covering the whole economy; and
- to support an integrated approach to the use of datasets for different policy purposes avoiding duplication of data collection.¹¹²

As background, the underlying conceptual framework is grounded in sound theoretical economic concepts with the consequence that it has remained largely unchanged over many decades. The periodic updates of the core manuals have thus focused on enhancements that: (1) address new economic and financial developments, and new and emerging policy needs; (2) provide a fuller exposition of existing conceptual advice; and (3) further integrate conceptual advice across the various macroeconomic statistical manuals.

To contribute to the discussion this section sets out some suggestions for enhancements to the macroeconomic statistical manuals with regard to credit quality, financial derivatives, remaining maturity and foreign currency, the sub-sector breakdown of NBFIs, and distinctions by size. In choosing these items, two considerations were taken into account:

¹¹¹ These manuals include the [Government Finance Statistics Manual](#), the [Monetary and Financial Statistics Manual and Compilation Guide](#), and the [External Debt Statistics and Public Debt Statistics Guides](#). The manuals are primarily intended to meet the needs of macroeconomic policy making and analysis. Their implementation promotes standardization across countries and consistency over time. These manuals are available at <http://www.imf.org/en/data>.

¹¹² The integration of conceptual advice across the manuals is one of the strengths of this family of manuals, allowing cross-sector interconnections to be identified. See for instance, “An Integrated Framework for Financial Flows and Positions on a From-Whom-To-Whom Basis,” Manik Shrestha and Reimund Mink, February 2011. See <http://www.imf.org/external/np/seminars/eng/2011/sta/pdf/whom.pdf>.

(1) That the proposed enhancements are consistent with, but avoid as far as possible overwhelming, the SNA framework. This is an important consideration because the conceptual framework of these macroeconomic statistical manuals is designed primarily for national authorities to collect, compile, and disseminate data to help support macroeconomic policy making; and

(2) The items are aligned with financial stability policy needs and tools based on identified user needs that have been commonly expressed and referenced earlier in the paper.

When referring ahead to including the enhancements in the "central framework," this means a proposal to include the enhancements in the core statistical accounts, not as supplementary or as memorandum items.

A. Nonperforming loan (NPL) and provisions

While the macroeconomic statistical manuals provide guidance to compile credit data, and the *System of National Accounts (SNA)* recommends supplementary items on contingent items such as loan commitments, letters of credit, guarantees, etc. (2008 SNA paragraph 11.24), there is a lack of information on credit quality for non-traded instruments in the central framework.¹¹³ Yet credit quality information is important to FSA as it is an indicator of problems borrowers are having, with implications for creditors.

The SNA does recommend memorandum items on NPLs, at nominal and market value, for the government and financial corporations sectors and if significant, as supplementary items for the other sectors, including the rest of the world (2008 SNA, paragraph 13.67). Provisions are in the central framework of the *Monetary and Financial Statistics Manual and Compilation Guide (MFSMCG)*, as they are taken into account when determining the capital of deposit-takers by being included in other accounts payable [Monetary Statistics[MS]] (see MFSMCG paragraph 2.32 and Figure 2.2).

Two possibilities exist for bringing some measure of creditworthiness into the central framework of the macroeconomic statistical manuals. First, NPLs at nominal value could be introduced into the central framework for all sectors with data from creditors providing information on the counterpart borrower sector.¹¹⁴ Flows for NPLs would be recorded as other changes in volume of assets (OCVA).

Second, provisions for losses on assets that are valued at nominal value could be brought into the central framework as provisions affect economic activity, both through the impact they have on the profitability of credit extension and, for deposit-takers, on capital through regulatory provisioning practices. Further, as credit quality worsens and provisions increase deposit-takers typically become more cautious in their lending activity. The flows would be

¹¹³ In the SNA, non-traded instruments are valued at nominal value, unlike traded instruments which are valued at market value.

¹¹⁴ A standard definition of NPLs was introduced in the FSI Compilation Guide and subsequently in the 2008 SNA.

recorded as OCVA given provisions are not an exchange between parties, allowing the outstanding value of loans to be calculated more closely reflecting their market value.¹¹⁵

This paper considers including provisions in the central framework rather than NPLs to be the more robust approach for the reasons given below, while there is already compilation experience through monetary data.

In the national accounts, if credit quality deteriorates, for traded instruments, the market price changes, resulting in lower net worth of the creditor or a decrease in the market price of the equity liability. However, for instruments valued at nominal value, such as loans, a deterioration in credit quality is not reflected in the value of the instrument but because it might well feed through to a lower market price of equity liabilities of creditors, is likely to be reflected in an increase in net worth as measured in the national accounts system. The latter arises because net worth is the balancing item of the national accounts balance sheet. So, the present approach reduces the analytical value of the accounts because it does not reflect economic developments in, or attribute them to, the relevant instruments, and disguises signs of worsening creditworthiness among debtors.

Unlike debt securities which the debtor can buy back in the market, for non-traded instruments there is not that opportunity, so from the debtor, and indeed creditor perspective, the value of the debt obligation remains the full contractual amount. So, it can be argued that the value of non-traded instruments valued at nominal value should remain the amount owed without adjustment for provisions, as indeed is the approach in the *MFSMCG* and *FSI Compilation Guide*, with provisions added as a separate line item in the accounts. This approach would have the advantage of not only ensuring that the amount owed continues to be recorded but that provisions and write-offs would be separate line items in OCVA, because write-offs, unlike provisions, reduce the amount owed and hence the outstanding value of the instrument.

Including provisions in the central framework of the macroeconomic statistical manuals would affect the timing of the transfer of value within the system as value would transfer when the provisions are made rather than when write-offs occur.¹¹⁶ But as indicated above such timing more accurately reflects the profitability and net worth of deposit-takers, and avoids disguising a deterioration in the creditworthiness of debtors.

B. Notional value of derivatives

Financial derivatives were introduced into the central framework in the 1990s as these markets began to flourish. The data are compiled at market value consistent with the principles of the SNA. However, financial derivatives are not debt instruments through which

¹¹⁵ The market value of loans is also impacted by changes in interest rates.

¹¹⁶ Value created and transferred stays within the system. In this way gains and losses in value arising from the policy actions arising from financial crises can be tracked through the national accounts. See Oliver Frecaut, "Indonesia's Banking Crisis: A New Perspective on \$50 Billion of Losses" *Economic Studies*, Vol. 40, Issue 1, 2004 and "A National Wealth Approach to Banking Crises and Financial Stability," IMF Working Paper 16/128.

economic agents finance imbalances in consumption and production but rather instruments through which risk is transferred around the system. Recording only market value misses the extent of risk exposures and transfers, and it is these risk exposures and transfers around the system that interest FSA.

So, to gain a fuller picture, not least to measure foreign currency exposures and leverage more broadly, data on notional value (in addition to market value) are needed. Indeed, the *Balance of Payments and International Investment Position Manual*, sixth edition (*BPM6*) includes the notional value of foreign currency derivatives in its memorandum table on foreign currency, while the BIS publishes notional (and market) values in its six-monthly survey of over-the-counter derivatives (on a cross-border consolidated basis). But despite these data sets, important as they are, there lacks a residence-based economy-wide picture of financial derivative positions by risk category by sector and sub-sector.

So, while recognizing that notional value does not fit the conceptual framework of the macroeconomic statistical manuals, but to provide a more comprehensive view of the risks underlying the economic and financial system, and how they change over time, the full range of financial derivative positions held, by type of risk category, by counterpart sectors, at notional value could be added as memorandum items.

C. Remaining maturity

Original maturity of debt assets and liabilities is the standard approach to maturity in the macroeconomic statistical manuals, with a distinction between short-term (up to one-year) and long-term (over one-year). While data on an original maturity basis is of interest to FSA in that it provides information on borrower's access to the short and long markets, there is greater FSA interest in remaining maturity as it informs on debt falling due in the near-term. Remaining maturity data helps indicate the amount of debt that needs to be refinanced, the liquidity of debtors and creditors, and the extent of maturity mismatches between assets and liabilities.

A number of manuals including the *BPM6*, *MFSMCG*, and *Public Debt Statistics* and *External Debt Statistics Guides*, have already introduced remaining maturity as a memorandum or supplementary item to position data: long-term original maturity data is broken down into up-to-one year due and over-one year due; and by adding the up-to-one year due data to short-term original maturity data, short-term maturity on a remaining maturity basis can be calculated without undermining the concept of original maturity. Bringing this distinction into the position data in the central framework of the macroeconomic statistical manuals would help meet the needs of FSA.¹¹⁷

D. Foreign currency

Policy makers have clearly indicated through the G-20 a need for more information on foreign currency exposures. The *MFSMCG* includes a domestic and foreign currency

¹¹⁷ A further remaining maturity breakdown within up-to-one year, at three months would also be of benefit for FSA but would add to the degree of disaggregation beyond the existing macroeconomic statistical framework.

breakdown through its sectoral balance sheet by instrument and counterpart; *BPM6* includes a memorandum table with a foreign currency breakdown of positions by sector, major currency, that also takes account of financial derivatives; and the *Public Debt Statistics* and *External Debt Statistics Guides* have domestic/foreign currency splits in their presentational tables.

Introducing a foreign currency/domestic currency breakdown into the central frameworks of both the *SNA* and the *BPM*, combined with the introduction of a remaining maturity breakdown in the position data would immensely improve understanding of the foreign currency risks facing the economy. Supplementary or memorandum items breaking down foreign currency data by major currency could also be considered.

E. Sub-sector breakdown of NBFIs

The 2008 *SNA* introduced a new breakdown of NBFIs¹¹⁸ with seven sub-sectors.¹¹⁹ The composition of the seven sub-sectors is logical and well-considered but depending on countries experience with compiling and analyzing data for the seven sub-sectors, the subsections of the NBFIs could be reviewed to determine if the sub-sectoring of NBFIs should be modified to meet the analytical needs of FSA.

The FSB has developed an analysis of shadow banking using five economic functions.¹²⁰ While such a characterization might not be appropriate for the *SNA*, given the interest of policy makers in shadow banking activity and entities, the work of the FSB could inform any *SNA* review of NBFIs sub-sectoring.¹²¹

F. Distinctions based on size

The *SNA* and *BPM6* frameworks make no allowance for size of entity in advising on the compilation of sector and sub-sector aggregate data. Nonetheless, there is considerable interest among financial stability analysts in activity by households by income level, by non-bank financial corporate by sales, assets, and/or employment, and deposit-takers by assets.

While such data are not typically disseminated by national statisticians, the raw data they receive from reporters often allows for such data to be compiled. Therefore, the possibility of

¹¹⁸ NBFIs is not a subsection recognized by the *SNA* but it is often referred to as covering all financial corporations except deposit-takers, including the central bank.

¹¹⁹ The seven sub-sectors are money market funds (MMFs), non-MMF investment funds, other financial intermediaries, except insurance corporations and pension funds, financial auxiliaries, captive financial institutions and money lenders, insurance corporations, and pension funds.

¹²⁰ These five functions are management of collective investment vehicles with features that make them susceptible to runs; lending dependent on short-term funding; market intermediation dependent on short-term funding or secured funding of client assets; facilitating credit creation; and securitization-based intermediation.

¹²¹ An OECD Working Party on Financial Statistics' survey of shadow banking using national accounts-based data also saw the possibility of distinguishing financial institutions and financial instruments "according to the criteria established by the FSB," see "Results of the Survey on Shadow Banking," OECD, October 2015 [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=COM/STD/DAF\(2015\)1&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=COM/STD/DAF(2015)1&docLanguage=En).

compiling and disseminating data by size, probably as memorandum items, could be investigated. The data for households could be informed by the work under the DGI on household distributional information.

VI. CONCLUDING REMARKS

The past 10–15 years have seen a major change in policy makers’ attitude to analyzing financial stability. Particularly since the GFC there has been an emergence of FSA governance arrangements alongside an increased focus on macro-prudential analysis. With FSA firmly established this paper has undertaken a holistic stock-take of the types of data series used. Our understanding is that this is the first review of its kind at the international level. The paper has found that while the specific datasets used can differ across country and over time, common patterns of data use emerge.

Where does this leave statisticians? Overall there has been an encouragingly constructive response to this increased policy focus on FSA, not least through the G-20 DGI. But more work is required to meet FSA data needs, not least in implementing the initiatives underway. This includes data relating to shadow banking, capital flows, and corporate borrowing, as well as the increased demand for granular data. Further, with the start of the update round of the *SNA* and *BPM* expected later this decade, this paper has identified enhancements such as adding provisions data and including remaining maturity and foreign currency breakdowns in the central framework to support FSA without undermining the conceptual framework of the manuals.

Appendix 1. Data Used in FSA

This appendix discusses the data used for FSA based on the research conducted by the authors and set out using the framework of analysis provided in Section III. The detailed list of the datasets identified by this review is available on request from the authors.

A) Increasing the resilience of the financial system

The data used covers a very broad range of activities, starting with the size and structure of the financial system including relative to GDP. Such data compiled over time provides not only a cross-sectoral view of the relative size of the financial sector and its components, but also picks up shifts in the structure and size over time, including those that could arise from changes in regulations.

Financial institutions

For deposit-takers, data collected and compiled to support prudential supervision of individual banking institutions remain essential. Further, at the aggregate level, balance sheet data provide an overview of funding (including retail/wholesale split), type of assets owned by instrument, sector, maturity and currency breakdowns,¹²² and of capital available, inter alia, allowing calculation of the equity capitalization to book value ratio. Further, data based on the IMF list of FSIs covering capital adequacy, credit worthiness, profitability, and liquidity indicators are monitored.¹²³

Separate indicators by domestic private, domestic state- and foreign-owned deposit-takers (preferably disclosing branches and subsidiaries separately) are analyzed given the differing nature of the capital (and potential liquidity) support. Concentration measures and structure, such as in terms of the types of deposit-takers, are also used, not least for assessing the potential impact on competition.

Whereas for deposit-takers there is often a significant amount of information available to financial stability analysts, with some exceptions, at this time such depth of information is

¹²² For example, the IMF paper “Macroeconomic Developments and Prospects in Less Developed Countries (LDCs)—2016” points out that foreign-currency denominated lending is a potential risk factor in many low-income developing countries, given the significance of foreign currency-denominated assets and liabilities on bank balance sheets. The paper notes that as seen in many more developed economies, the quality of foreign currency loans to unhedged domestic borrowers can be quickly impaired by significant depreciation of the domestic currency (paragraph 44). See www.imf.org/external/np/pp/eng/2016/112316.pdf.

¹²³ See “Modifications to the Current List of Financial Soundness Indicators.” IMF 2013. <https://www.imf.org/external/np/pp/eng/2013/111313.pdf>. Basel III introduced two new liquidity requirements for deposit-takers - Liquidity Coverage Ratio (LCR) and net stable funding ratio (NSFR), (see <http://www.bis.org/publ/bcbs189.pdf>) and they have been adopted in the revised list of FSIs. With regard to deposit-taker liquidity see also “Principles for Sound Liquidity Risk Management and Supervision,” Basel Committee on Banking Supervision, September 2008, <http://www.bis.org/publ/bcbs144.htm>.

lacking for NBFIs.¹²⁴ Nonetheless there is increasing interest in data on non-bank financials, particularly broken down by type of activity in order to assess the scale and type of risks to which they are exposed.

Typically, the types of data analyzed are those covering balance sheets, assets and liabilities, with granular instrument, maturity, currency, breakdowns for insurance companies, pension funds, MMF, investment funds (such as hedge and bond funds), mutual credit institutions, and leasing companies, etc. Leverage, liquidity, and various profitability indicators are also monitored. Beyond these datasets the significant heterogeneity among these entities means that different types of datasets are used depending upon the type of NBFI; for example, solvency measures for insurance companies and actuarial liabilities of defined pension funds are dataset very specific to those types of NBFI.

Financial Markets¹²⁵

Monitoring activity in financial markets is increasingly important for FSA. These markets include the money markets, other short-term borrowing markets (such as repurchase and security lending), debt security, equity, derivatives and foreign exchange markets. In addition to their role in allocating savings and supplying short-term finance to financial institutions, financial markets provide real-time price signals, both for the market as a whole and for individual institutions: including from interest rates and yield curves; spreads, such as between domestic government bonds and international benchmarks; credit default swap rates; and exchange rates.

Experience suggests that too often in financial crisis the lack of liquidity, previously deep and so creating an illusion of continued availability, has been a cause of severe financial difficulty as investors all try to exit at the same time. So, an important aspect of financial sector resilience is the depth of domestic financial markets. Also, deeper and more liquid domestic financial markets can reduce the incentive for domestic corporations and government to borrow in foreign markets and so reduce the vulnerability to foreign induced shocks, in particular vulnerability to foreign exchange risk.¹²⁶¹²⁷ So liquidity indicators are monitored, including data on inventories (and scaled by trading volume and including hedges and other offsetting positions) of dealers who intermediate in these markets due to their important role in providing liquidity.

Further, FSA financial market monitoring includes data on market capitalization, the volume (turnover) of activity; the type of investors in the market, and their interrelationships,

¹²⁴ See for instance, Chapter 3: “The Asset Management Industry and Financial Stability,” *Global Financial Stability Report*, April 2015. <http://www.imf.org/External/Pubs/FT/GFSR/2015/01/index.htm>.

¹²⁵ The resilience of the financial system can be looked at from the viewpoint of both a holistic view of institutions by type of institution using data on the range of their activities and positions, and by the activities of all institutions transacting in a specific market - institution-or market-based monitoring.

¹²⁶ However, domestic markets could still be exposed to spillover risks from external capital flows.

¹²⁷ The original list of FSIs included two market liquidity indicators—average bid-ask spread in the securities market; and average daily turnover ratio in the securities market—but as these data are readily available from commercial sources in most countries, they were dropped in the revised list.

particularly relevant if financial stability conditions become fragile; the extent to which collateral is used and reused and with what “haircut” - with changes in the level of the “haircut” providing information on market sentiment; where relevant, gross short positions by type of participant; and with regard to derivatives markets, the scale of on- and over-the-counter market activity.

Financial market infrastructure and inclusion

The effective operation of financial market infrastructure such as payments systems and clearing houses, including Central Counter-parties (CCP), is a crucial aspect of financial stability, as any failure of such infrastructure can cause significant losses on the financial sector and their customers, as well as undermine trust in the financial system. In broad terms data covering scale of activity (including scale and timing of intra-day settlements), margining requirements, and capitalization are monitored.

Further, financial inclusion impacts FSA, in that beyond the economic benefits arising to households from financial inclusion, broader participation in the formal financial system adds to liquidity and the spreading of risks.¹²⁸ Various indicators including access to banks, Automated Teller Machines (ATM) and Mobile Money Accounts are used to monitor the supply of financial services to the household sector, along with indicators that assess the associated risks.

B) Containing the build-up of systemic vulnerabilities: Credit, debt and asset prices

Credit-related

As noted in a 2012 IMF paper, prolonged credit booms are a harbinger of financial crises and have real costs while the optimal macro-prudential policy response, as well as the optimal policy mix, will likely have to depend on the type of credit boom.¹²⁹ So the demands from financial stability analysts are for increasingly detailed breakdowns of this indicator. To this end, there is a growing interest in collecting granular data from deposit-takers to allow for the compilation of various types of specific dimensions by the compiling agency. Measures of credit monitored can include borrowing in foreign markets, such as in foreign debt security markets, and from foreign parents of domestic entities.¹³⁰ Further, the growth of credit

¹²⁸ For a discussion on the trade-offs between the benefits and risks of greater financial inclusion see Mehroratra, A and Yetman, J (2015), “Financial Inclusion-issues for central banks,” BIS Quarterly Review, March 2015. See http://www.bis.org/publ/qtrpdf/r_qt1503h.pdf.

¹²⁹ Dell’ Ariccia, Giovanni; Deniz Igan, Luc Laeven, and Hui Tong with Bas Bakker and Jerome Vandebussche: Policies for Macroeconomic Stability: How to Deal with Credit Booms,” IMF Staff Discussion Note, June 2012. See <https://www.imf.org/external/pubs/ft/sdn/2012/sdn1206.pdf>.

¹³⁰ The BIS definition of credit data published for 43 countries covers loan, debt security, and currency and deposit liabilities of the private nonfinancial sector to domestic banks, all domestic sectors, and nonresidents. See https://www.bis.org/publ/qtrpdf/r_qt1609c.htm.

through the FinTech industry, such as peer-to-peer lending, is beginning to be monitored where relevant.¹³¹

In short, among the data used for FSA are total credit, its growth and size relative to GDP, its currency composition, maturity profile, and the interest rates charged; the sector, industry and regional distribution of credit; the provision of credit by type (loan, securities, trade credit etc.) and ownership of institution (private domestic, domestic state-owned, and foreign-owned); the type of household credit (mortgage,¹³² credit card, student loans etc.); commercial real estate credit (including real estate companies); collateralized and non-collateralized loans distinguished; and measures of asset quality such as nonperforming loans and provisions data. And various combinations of these variables.

For developing economies, financial deepening in terms of the involvement of the non-bank private sector is an important aspect of FSA. Such data that may be drawn upon are credit to the private sector as percentage of GDP, in addition to the financial inclusion indicators described above.¹³³

Further, due to the inherent risks, data on deposit-takers connected lending—banks lending to an entity that has ownership connections with the deposit-taker providing the credit, concentrated lending—banks lending to a common lender, and directed lending—government directing deposit-takers to whom to lend, as percentage of total loans are monitored.

Debt-related

The relevance of debt to FSA lies in monitoring its total size, not least relative to GDP, an indicator considered highly relevant for FSA, its composition in terms of instruments, currencies, and maturity, and in the ability (or lack of ability) of debtors to service their debt.¹³⁴ ¹³⁵ Further liquidity and solvency problems can arise with high levels of debt relative to income and wealth. Detailed information on government debt (at both nominal and market values), is particularly important given its central role in financial markets and as an indicator

¹³¹ Peer-to-peer lending brings together individual lenders and borrowers outside the traditional deposit-taking system.

¹³² “Mortgage” is a common word to use for residential real estate loans, but more precisely the interest is in household debt collateralized by residential real estate.

¹³³ For instance, see the Financial System Stability Assessment for the Central African Economic and Monetary Community, April 2016. See <http://www.imf.org/external/pubs/cat/longres.aspx?sk=43874.0>.

¹³⁴ For instance, see “*This time is different: A panoramic view of eight centuries of financial crises*,” Carmen M. Reinhart and Kenneth S. Rogoff, 2009, Princeton University Press.

¹³⁵ Debt covers a broad range of instruments - those that require payments of interest and/or principal to be made, including currency and deposits, debt securities, and loans as well as instruments such as trade credit and contractual pension liabilities. The scope of debt instruments is described in the *External Debt Statistics Guide and Public Sector Debt Statistics Guide*, prepared by the Task Force on Finance Statistics (<http://www.tffs.org>).

of sovereign risk.¹³⁶ Also, data on the sector of the depositor and the scale and composition of wholesale borrowing are also used to better understand the diversification of funding sources for deposit-takers and to assess the concentration risks of the financial institutions.¹³⁷

Further, currency and maturity mismatches between assets and liabilities can raise potential financial stability risks regardless of sector, hence the use of remaining maturity and foreign currency data.

Also, related to debt is the concept of leverage—the relative size of debt to equity in funding the asset side of the balance sheet. What might be considered excessive leverage caused problems for some financial institutions in the GFC as sharp declines in asset prices meant that their debt positions exceeded the value of their assets, wiping out their capital base. Leverage is measured through balance sheet data, but the use of off-balance sheet instruments such as financial derivatives—whereby exposures entered into greatly exceed the initial investment, mean that leverage measures used also take account of off-balance sheet positions.¹³⁸ These leverage measures are relevant for all economic sectors, although those for households and government differ from corporations in that to all intents and purposes these sectors do not have equity capital, although they have assets against which debt can be set—so called “net debt” measures.

Non-financial corporate (NFC), household (HH) and government sectors

As customers of the financial sector, data on NFC and HH are monitored as problems in these sectors can cause problems for the financial sector, and vice versa. For both sectors, comprehensive balance sheet data is the starting point for FSA, including assets and liabilities (in domestic and foreign currencies), equity (for NFC), and net worth.

For NFC, there is interest in profitability (e.g., return on assets), and various income and debt measures (including interest coverage ratio,¹³⁹ debt service ratio, and interest exposure (fixed and variable)) to assess their creditworthiness. Further to identify “risky companies,” and so gauge the amount of credit out of total credit to such companies, measures such as high

¹³⁶ The IMF’s Debt Sustainability Analysis framework assesses a country’s current debt situation and identifies vulnerabilities in the debt structure covering analysis of the sustainability of total public debt and that of total external debt. Two types of frameworks have been designed: those for [market-access countries](#) and those tailored for [low-income countries](#). See <http://www.imf.org/external/pubs/ft/dsa/>. Typically debt sustainability analysis is conducted at nominal value - see chapter 14 of the *External Debt Statistics Guide* - <http://www.tffs.org/edsguide.htm>.

¹³⁷ More specifically, the IMF paper “Macroeconomic developments and prospects in LDCs - 2016” points out that over reliance on public sector funding could be a risk factor in several countries, particularly oil exporters, as the fiscal conditions could easily lead to drawing of public deposits hence resulting in funding strains in financial institutions. <http://www.imf.org/external/np/pp/eng/2016/112316.pdf>.

¹³⁸ Under Basel III, the calculation of leverage takes account of the market value and an “add-on” to take of the potential future exposure in the remaining life of the financial derivative contract. The “add-on” is calculated by applying an add-on factor to the notional principal amount of the financial derivative.

¹³⁹ The interest coverage ratio is usually defined as earnings before interest and tax (EBIT) to interest.

interest coverage ratios are used. And monitoring activity by industry and size (large, and small and medium sized enterprises (SME)) is becoming important.

For HH, various income (e.g., disposable income) and debt measures (e.g., debt service to disposable income) are monitored, including by income distribution. “Risky households” are identified based on debt service ratios and negative net financial assets. But also relevant is information on household assets, whether they are in financial or non-financial assets, whether liquid or not.

For government, in addition to the potential impact of debt and deficits on financial stability, public sector arrears to private sector suppliers can be a transmission channel through which fiscal strains undermine non-financial corporate and financial sector health.¹⁴⁰ Further, contingent liabilities can be a potential source of financial risk.¹⁴¹

Asset prices

Among asset prices, real estate prices, both for residential and commercial property, as well as for land are closely monitored. Financial institutions lend against the collateral of real estate, while for households’ mortgage loans are invariably the largest liability they take out, and if prices fall below the value of the loan (so-called negative equity) they can face financial difficulties. Consequently, real estate prices are closely watched albeit the problem of homogeneity of properties and infrequency of transactions of the same property make measurement a conceptual challenge.¹⁴² There is also interest in other housing-related indicators such as the volume of transactions, price-to-rent and price-to-income ratios, including by region, and in commercial real estate indicators such as commercial property yields and vacancy rates.

Financial market asset prices, such as equity and bond prices, and its components of equity prices by type of sector - for instance, commodity-related, financial-related, foreign-demand related, etc., are also monitored for FSA, not least when used as collateral. Such prices directly impact financial wealth and can indirectly impact the economy through the effect on consumer and corporate confidence. There is also considerable interest in volatility measures, both intra-day and over time. A popular measure is the VIX indices from the Chicago Board Options Exchange such as on equity prices, interest rates, exchange-traded funds, and currency-related, as volatility is telling something about uncertainties/risk in the markets.

¹⁴⁰ See IMF paper “Macroeconomic developments and prospects in LDCs, 2016.”

¹⁴¹ For example, Australia (<http://www.budget.gov.au/2016-17/content/bp1/download/bp1.pdf> , statement 8) and New Zealand (see <http://www.treasury.govt.nz/budget/forecasts/befu2016>, page 82) annually assess the potential fiscal risks of contingent liabilities.

¹⁴² A 2011 IMF working paper investigated the question: what kind of indicators should trigger policy intervention to stop or slow down a real estate boom. See “How to Deal with Real Estate Booms: Lessons from Country Experiences,” Crowe, Dell’Ariccia, Igan, and Rabanal, <https://www.imf.org/external/pubs/ft/wp/2011/wp1191.pdf>.

C) **Structural vulnerabilities within the financial system: Financial interconnections and spillovers**

One message that clearly emerged from the GFC was the importance of monitoring financial interconnections both within economies and across border.¹⁴³ The data sets used to meet these requests include sectoral balance sheets, to-whom from-whom data, and the major cross-border internationally coordinated surveys such the BIS IBS and the IMF's CPIS and CDIS.

More specifically, an increasingly important aspect of the work on interconnectedness relates to debt both from the debtor and creditor perspective, at the national and sectoral level and in terms of to-whom is the debt is owed. Who owes what to-whom is as important for the soundness of the creditors as it is for the creditworthiness of the borrowers. Further, interconnections that arise through ownership structures among financial institutions, and between financial institutions and non-financial corporations, need to be monitored as they can have systemic implications for the efficiency, and perhaps the stability of, the financial system.

The cross-border interconnections of the deposit-taking sector are particularly important because it is through these institutions that financial stability issues in foreign economies can be transmitted into domestic economy. So, data on cross-border assets and liabilities, preferably on a granular basis (including by individual deposit-taker), are used, with instrument, country, sector, and currency breakdowns. This is relevant on both residence- and cross—border consolidated (nationality) based approaches.^{144 145}

The GFC demonstrated that some institutions are so big that when they get into difficulty it has global consequences. For these Global Systemically Important Financial Institutions, and particularly G-SIBs,¹⁴⁶ extra capital charges have been imposed to offset what might be seen as a too-big-to-fail benefit.¹⁴⁷ Under the G-20 DGI data are being collected in a common

¹⁴³ The IMF's 2014 Triennial Surveillance Review (TSR) noted the importance of an in-depth view of how global and domestic shocks affect individual economies and propagate across sectors (paragraph 18 of the Overview paper, www.imf.org/external/np/pp/eng/2014/073014.pdf). For this purpose, the TSR called for the adoption of the *Balance Sheet Approach* (BSA) and the development of a *global flow of funds*. See "Global Flow of Funds: Mapping Bilateral Geographic Flows" ISI conference, Hong Kong 2013 for a description of the global flow of funds. See www.statistics.gov.hk/wsc/STS083-P1-S.pdf.

¹⁴⁴ See Bruno Tissot, "Globalisation and financial stability risks: is the residency-based approach of the national accounts old-fashioned?" BIS Working Papers, No. 587, October 2016. See www.bis.org/publ/work587.htm.

¹⁴⁵ The BIS consolidated international banking statistics differ from the *SNA*-based concepts due to the use of a consolidated (nationality) rather than residence-based approach with regard to the bank reporters. These data were developed in the 1970-80s to capture international banking business not covered by the resident-based data.

¹⁴⁶ G-SIBs are identified through an indicator-based measurement approach that take into consideration size, interconnectedness, substitutability, complexity and cross-jurisdiction activity. For more information see www.fsb.org/2015/11/fsb-publishes-the-2015-update-of-the-g-sib-list/ and www.bis.org/publ/bcbs255.htm.

¹⁴⁷ Similar work has been undertaken for G-SIIs with additional capital charges scheduled to be applied starting in 2022. See <http://www.fsb.org/wp-content/uploads/FSB-publishes-2016-G-SII-list.pdf>.

template on the relationships among G-SIBs and their exposure to national sectors and markets.¹⁴⁸ Inter alia, these data allow identification of common exposures. At the domestic level, similar considerations can arise for Domestic Systemically Important Financial Institutions.

To inform on the reliance of residents on different sources of external finance that could dry up if there was a period of financial stress in foreign economies data are used on residents borrowing: (1) directly from abroad; (2) from domestic branches of foreign deposit-takers; and (3) through foreign subsidiaries of resident entities. Indeed, evidence has shown that increased reliance by deposit-takers on wholesale borrowing from abroad may be an early indication that credit growth in the economy is becoming unsustainable.¹⁴⁹

Swings in scale and direction of cross-border capital flows can have financial stability consequences.¹⁵⁰ In response the IMF has, since 2011, been publishing an annual Spillover Report that initially focused on the major economies whose policies have spillover implications.¹⁵¹ The IMF has also developed an institutional view on capital flow measures.¹⁵² More recently the G-20 IFA working group has also focused attention on capital flows and crisis prevention.¹⁵³ Balance of payments data are a key source of information but for spillover analysis also relevant are bond yields to assess the correlation of yields across national financial markets; GDP and industrial production to assess the impact of cross-border spillovers on real activity; and, international investment position (IIP) data, and external debt data, of which short-term, government debt, and corporate debt securities by currency and by country of creditor, to identify potential vulnerabilities to changes in capital flows.

In the context of spillover analysis, the G-20 in particular has been interested in global liquidity and its drivers, as the global liquidity environment can have implications for

¹⁴⁸ See Appendix 2 for information on the collection of data from G-SIBs.

¹⁴⁹For instance, see “Global credit and domestic credit booms,” Claudio Borio, Robert McCauley and Patrick McGuire, BIS Quarterly Review, September 2011. See http://www.bis.org/publ/qtrpdf/r_qt1109f.pdf.

¹⁵⁰ For instance, see “Strengthening the International Monetary System—A stock-taking” page 23, IMF, March 2016. See www.imf.org/external/np/pp/eng/2016/022216b.pdf. Also, it is argued that open capital markets create a “financial trilemma” in that only two of (1) national control over financial policies; (2) financial integration with the global market; and (3) financial stability, can be enjoyed simultaneously. See “Trilemmas and trade-offs: living with financial globalisation,” Maurice Obstfeld, BIS Working Papers, No. 480, January 2015. <http://www.bis.org/publ/work480.pdf>.

¹⁵¹ See “2015 Spillover Report,” IMF June 2015. See <http://www.imf.org/external/np/pp/eng/2015/060815.pdf>.

¹⁵² See “The Liberalization and Management of Capital Flows: An Institutional View.” IMF, November 2012. See www.imf.org/external/np/pp/eng/2012/111412.pdf.

¹⁵³ The working group was reactivated in 2016 in response of a G-20 call to strengthen the international financial architecture. The 2016 *Final Report* is available at www.g20.utoronto.ca/2016/P020160815362591309719.pdf.

domestic macro prudential policy.¹⁵⁴ The BIS publishes global liquidity indicators that draw on bank credit data from the IMF, BIS locational banking statistics, and BIS debt securities data.¹⁵⁵

Finally, national FSAs typically consider the international environment, monitoring developments in foreign economies using real and financial indicators, and where relevant commodity prices such as oil.

¹⁵⁴ For instance, see “Economic resilience: a financial perspective, Note submitted to the G-20,” page 17, BIS November 2016, <http://www.g20.utoronto.ca/2017/2017-Germany-BIS-economic-resilience.pdf>.

¹⁵⁵ Global liquidity indicators are published quarterly in the [BIS Statistical Bulletin](#).

Appendix 2. What has been the Response of Statisticians to the Growing Interest in FSA?

The single most important initiative of the statistical community in meeting the needs of FSA since the GFC has been the G-20 DGI.¹⁵⁶

Data Gaps Initiative

The DGI, now in its second phase, was launched as a response to data gaps identified by policy makers and analysts in the immediate aftermath of the GFC. Consequently, the DGI is primarily focused on financial stability policy needs.¹⁵⁷ The DGI consists of 20 recommendations that both strengthen and enhance existing statistical initiatives and, in some instances, initiate new statistical collections.¹⁵⁸

Among the data sets promoted under the DGI are:

- *Financial Soundness Indicators (FSIs)*: Developed to meet the needs of FSA following the Asian crisis of the late 1990s. In response to the DGI, the list of FSIs was updated in 2013 following a global consultation.¹⁵⁹ Focused primarily on deposit-takers, FSIs take a macro look at supervisory-type data covering capital, profitability, asset quality, liquidity, and market risk sensitivity. The data are largely drawn from supervisory balance sheet data and income statements, compiled for deposit-takers. In addition, the updated FSI list includes the size and investments of NBFIs, solvency and liquidity indicators for NFCs, debt to disposable income ratio for HH, and as a core indicator, residential real estate prices, which some countries are reporting. The number of countries reporting FSI data to the IMF increased to over 120 by 2016. A table of FSIs is typically presented in FSAP assessments, and included in the *GFSR*.
- *Concentration and distribution measures (CDM)* can identify vulnerabilities developing within the deposit-taking sector that aggregate data may disguise. To this end, under the DGI, the IMF undertook a pilot project on CDMs with member

¹⁵⁶ The G-20 DGI was launched in 2009 at the request of the G-20 Finance Ministers and Central Bank Governors, to whom the IMF and FSB Secretariat provide a progress report each year, and by the IMF's International Monetary and Financial Committee (IMFC). The DGI is overseen by the IAG.

¹⁵⁷ See "Why are the G-20 Data Gaps Initiative and the SDDS Plus relevant for financial stability analysis?" www.imf.org/external/pubs/ft/wp/2013/wp1306.pdf IMF Working paper 13/6, and "G-20 Data Gaps Initiative II: Meeting the Policy Challenge," IMF Working paper 16/43, March 2016, Robert Heath and Evrim Bese Goksu, <https://www.imf.org/external/pubs/cat/longres.aspx?sk=43760.0>.

¹⁵⁸ Specific action plans for the implementation of the DGI-2 recommendations are included in the FSB/IMF First Progress Report of the G-20 DGI-2, <http://www.imf.org/external/np/g20/pdf/2016/090216.pdf>.

¹⁵⁹ See "Modifications to the Current List of Financial Soundness Indicators." IMF 2013, <https://www.imf.org/external/np/pp/eng/2013/111313.pdf>.

countries on a voluntary basis based on a selected number of FSIs.¹⁶⁰ DGI-2 will investigate whether to collect such data on a regular basis.

- *Debt Statistics*: The early 2000s witnessed the development of conceptual advice on external debt statistics, with public sector debt statistics following a few years later.¹⁶¹ The two guides, published under the auspices of the Task Force on Finance Statistics (TFFS),¹⁶² provide internationally agreed guidance for the measurement of debt, incorporating foreign currency, debt service, remaining maturity, and, for external debt, ultimate risk concepts. The DGI recommended the reporting of public sector debt data to the World Bank (host)/IMF/OECD quarterly public sector debt statistics hub. By 2016 over 70 economies reported data, while over 120 countries report data consistent with the *External Debt Statistics Guide* to the World Bank (host)/IMF quarterly joint external debt hub.¹⁶³
- *Securities statistics*: To promote improved reporting of security statistics, in 2015 the Working Group on Securities Databases (WGSD) published a *Handbook on Security Statistics (Handbook)*.¹⁶⁴ The *Handbook* provides high-level and detailed presentation tables that assist in the compilation and dissemination of securities statistics, along with classifications for different possible breakdowns.¹⁶⁵ DGI-2 sets the reporting of debt securities issuance data to the BIS on a quarterly frequency, starting with sector, currency, type of interest rate, and original maturity as an objective for G-20 economies.
- *Real estate prices*: The DGI recommended a two-pronged approach: the BIS and its member central banks to disseminate available real estate prices, both residential and commercial—by 2016, 58 countries reported data;¹⁶⁶ and the ISWGPS to publish robust methodology—a *Handbook on Residential Property Price Indices* was

¹⁶⁰ See Pilot Project on “Concentration and Distribution Measures for a Selected Set of Financial Soundness Indicators.” Joseph Crowley; Plapa Koukpmou; Elena Loukoianova; and André Mialou, IMF WP 16/26, <http://www.imf.org/external/pubs/cat/longres.aspx?sk=43706.0>.

¹⁶¹ The most recent editions of these guides are, [External Debt Statistics Guide](#), 2013 and [Public Sector Debt Statistics Guide](#), 2011.

¹⁶² The member agencies of the TFFS are the BIS, the Commonwealth Secretariat, the ECB, Eurostat, the IMF, OECD, the United Nations Conference on Trade and Development (UNCTAD) and the World Bank.

¹⁶³ See <http://datatopics.worldbank.org/debt/>.

¹⁶⁴ Working Group on Securities Databases, *Handbook on Security Statistics*, 2015. <http://www.imf.org/external/np/sta/wgsd/pdf/hss.pdf>. The members of the WGSD are the BIS, the ECB, the IMF, and the World Bank.

¹⁶⁵ See www.imf.org/external/np/sta/wgsd/pdf/hss.pdf.

¹⁶⁶ See www.bis.org/statistics/pp.htm.

published in 2013,¹⁶⁷ and prepare guidance on compiling commercial real estate price indices.

- *Derivative and repo statistics:* Following the GFC, the BIS enhanced data on credit derivatives.¹⁶⁸ Subsequently, the FSB created two separate expert groups with the objective of aggregating micro-data on derivative markets¹⁶⁹ and on repo and security lending markets^{170 171} to support analysis of the financial stability risks in these markets.
- *Shadow banking:* The FSB at the request of the G-20 has been producing an annual report on shadow banking since 2011 primarily using national accounts-based data from national sources to gain at least a broad estimate of the size of this sector of the economy. For FSA, this is necessary but not sufficient as there is a need for more refined disaggregation along the lines of economic functionality and a greater focus on risk analysis than is possible solely with national accounts-based data. With the help of member countries, the FSB is refining its estimates to meet FSA needs, supported by DGI-2.
- *Sectoral accounts:* Comprehensive sectoral balance sheet data are essential for FSA to provide an overview of developments across the whole economy as well as allowing the compilation of many relevant ratios, such as debt to equity (leverage), financial assets and liabilities of individual sectors to total assets and liabilities, etc. In addition, to-whom from-whom data compiled under sectoral accounts provide valuable information on domestic interconnections. For these reasons alone, the dissemination of a comprehensive set of sectoral accounts is probably the single most

¹⁶⁷ The [Handbook](#) was co-ordinated by Eurostat under the joint responsibility of the International Labour Organization (ILO), the IMF, OECD, Eurostat, the United Nations Economic Commission for Europe (UNECE), and the World Bank. See ec.europa.eu/eurostat/documents/3859598/5925925/KS-RA-12-022-EN.PDF.

¹⁶⁸ See “Credit risk transfer statistics,” CGFS Publications, No. 35, September 2009, www.bis.org/publ/cgfs35.htm. Also, for further information on derivatives data published by the BIS, see “Derivatives statistics: the BIS contribution,” Bruno Tissot, ISI conference, Rio de Janeiro, July 2015. See https://www.bis.org/ifc/events/ifc_isi_2015/089_tissot_paper.pdf.

¹⁶⁹ See “Feasibility study on approaches to aggregate OTC derivatives data,” FSB, September 2014. See http://www.fsb.org/wp-content/uploads/r_140919.pdf.

¹⁷⁰ See “Strengthening Oversight and Regulation of Shadow Banking: Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos,” FSB, August 2013. See http://www.fsb.org/wp-content/uploads/r_130829b.pdf.

¹⁷¹ See FSB Standards and Processes for Global Securities Financing Data Collection and Aggregation, November 2015, <http://www.fsb.org/wp-content/uploads/FSB-Standards-for-Global-Securities-Financing-Data-Collection.pdf>.

important contribution national account statisticians could make towards supporting FSA.¹⁷²

Further, the work under the DGI by the OECD in close cooperation with Eurostat and the ECB on distributional data on household income, consumption and wealth can help identify inequalities that could impact FSA.¹⁷³

- *International investment position*: The DGI promoted quarterly IIP data, which became a required item in the Special Data Dissemination Standard (SDDS) in September 2014.¹⁷⁴ More broadly, the G-20 DGI is supporting work to improve the availability of foreign currency data¹⁷⁵ including by promoting the foreign currency and remaining maturity enhancements to the IIP included in *BPM6*.
- *International Banking Statistics*: The BIS IBS data have existed since the 1960s. Over time as analytical needs have emerged, the data have been enhanced. In 2012, the Committee on the Global Financial System (CGFS), which oversees the collection of the BIS IBS, approved a major set of enhancements to close gaps in the information available to monitor and respond to financial stability risks. The BIS and its central banks started publishing data with the new enhancements by 2015 and intend to disseminate more data depending on the progress made by reporting countries.¹⁷⁶
- *Global Flow of Funds*: While the DGI does not have a specific recommendation to develop a global flow of funds, it does cover most of the data sets needed to compile such a matrix. This includes recommending more frequent compilation of the CPIS with sector breakdowns and, in DGI-2, compilation of both inward and outward CDIS. While a global flow of funds concept has been developed that will allow analysis of financial interconnections within and across border, the work is still in its embryonic stage.
- *Global Systemically Important Banks*: In response to two recommendations in the DGI, two unique datasets based on common templates have been developed that

¹⁷² An extensive sector balance sheet template was internationally agreed in 2012 as a longer-term objective for IMF and OECD economies to work towards, <http://www.imf.org/external/np/sta/templates/sectacct/index.htm>.

¹⁷³ For instance, see a presentation on this work at <https://www.oecd.org/els/soc/Session4-3-Work-of-EG-DNA.pdf>.

¹⁷⁴ The SDDS is a data transparency standard to which IMF member countries voluntary subscribe. See <http://dsbb.imf.org/Pages/SDDS/home.aspx>.

¹⁷⁵ See G-20 Finance Ministers and Central Bank Governors communique, April 2014. See <http://www.fin.gc.ca/n14/14-054-eng.asp>.

¹⁷⁶ The enhancements include expanding the coverage of banks' balance sheets to include their domestic positions, as well as their international activities, and provide more information about the sector of banks' counterparties, in particular banks' exposures to and reliance on funding from non-bank financial counterparts. Please see "Enhanced data to analyse international banking," by Stefan Avdjiev, Patrick McGuire and Philip Wooldridge, *BIS Quarterly Review*, September 2015. See www.bis.org/publ/qtrpdf/r_qt1509f.htm.

allow monitoring of both the bilateral institutional links of GSIBs and also their exposures to national markets and sectors.¹⁷⁷ The work is led by the FSB, in close consultation with the IMF, with a data hub established at the BIS to collect and process the national data in a confidential setting. In DGI-2, the possibility of a common data template for global systemically important NBFIs starting with insurance companies is being investigated.

- *Granular data:* To help identify emerging risks to financial stability there is an increasing demand among policy makers for granular data, such as for loans by deposit-takers. Granular data not only allows closer scrutiny of activity, but also allows for the compilation of many different dis-aggregations of data depending upon the needs of policy makers. It might also reduce the costs for reporters by reducing the need to compile different types of disaggregations as policy needs change. However, there are clearly confidentiality issues involved. DGI-2 includes a recommendation to investigate the possibilities, including sharing data across border.

Special Data Dissemination Standard Plus (SDDS Plus)

The SDDS Plus was established by the IMF in 2014 as the third tier of the IMF's data dissemination standards initiative.¹⁷⁸ It draws heavily on the DGI datasets with an objective to “guide member countries on the provision of economic and financial data to the public in support of domestic and international financial stability.” There are nine datasets that provide information on the real and government sectors, but most extensively on the financial and external sectors.¹⁷⁹

Data Sets At-A-glance

The IMF paper 2012 Review of Data Provision to the Fund for Surveillance Purposes contained a list of data sources (with web addresses) both from the IMF and other IOs in Appendix 8. Many of these data sources are relevant for FSA.

¹⁷⁷ See www.fsb.org/2014/05/r_140506/.

¹⁷⁸ See <http://dsbb.imf.org>.

¹⁷⁹ The nine datasets are: sectoral balance sheets, general government operations and debt, other financial corporations survey, FSIs, debt securities, Coordinated Portfolio and Direct investment surveys, and the currency composition of official foreign exchange reserves (COFER) survey.

References

- Alexandrova-Kabadjova, Biliana; Bernardo Bravo-Benitez, Serafin Martinez-Jaramillo, and Juan Pablo Solórzano-Margain, “An Empirical Study of the Mexican Banking System's Network and its Implications for Systemic Risk,” Banco de Mexico, Working Papers, No.2 012--07, http://catedrabde.uji.es/naim/images/presentations/banxico_wp.pdf.
- Australia Government, the Treasury, *Budget Strategy and Outlook Budget Paper No. 1, 2016-17*, <http://www.budget.gov.au/2016-17/content/bp1/download/bp1.pdf>.
- Avdjiev, Stefan; McGuire, Patrick; and Wooldridge, Philip, “Enhanced data to analyse international banking,” *BIS Quarterly Review*, September 2015. http://www.bis.org/publ/qtrpdf/r_qt1509f.htm.
- BIS/FSB, 2014 “Summary: Joint CGFS – FSB-SCAV workshop on risks from currency mismatches and leverage on corporate balance sheets,” http://www.fsb.org/wp-content/uploads/r_140923a.pdf.
- BIS, “Economic resilience: a financial perspective, Note submitted to the G20,” November 2016, <http://www.g20.utoronto.ca/2017/2017-Germany-BIS-economic-resilience.pdf>.
- Bank of Korea, Financial Stability Bulletin, June 2016: <http://www.bok.or.kr/broadcast.action?menuNaviId=2578>.
- Basel Committee on Banking Supervision, “Scope of Application, International Convergence of Capital Measurement and Capital Standards,” June 2006: www.bis.org/publ/bcbs128.htm.
- Basel Committee on Banking Supervision, “Principles for Sound Liquidity Risk Management and Supervision,” September 2008, <http://www.bis.org/publ/bcbs144.htm>.
- Basel Committee on Banking Supervision, 2012, “Principles for effective risk data aggregation and risk reporting,” <http://www.bis.org/publ/bcbs239.pdf>.
- Basel Committee on Banking Supervision, “Revised Pillar 3 disclosure requirements,” January 2015, <http://www.bis.org/bcbs/publ/d309.pdf>.
- Bean, Charlie, “Independent review of UK economic and financial statistics,” March 2016, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/507081/2904936_Bean_Review_Web_Accessible.pdf.
- Bernanke, Ben, “Should monetary policy take into account risks to financial stability?,” Brookings Institute, April 2015, <https://www.brookings.edu/blog/ben-bernanke/2015/04/07/should-monetary-policy-take-into-account-risks-to-financial-stability/>.

- Borio, Claudio, McCauley Robert, and McGuire, Patrick, “Global credit and domestic credit booms,” *BIS Quarterly Review*, September 2011. See http://www.bis.org/publ/qtrpdf/r_qt1109f.pdf.
- Cecchetti Stephen G, Fender Ingo, and McGuire Patrick, “Toward a global risk map” page 5, BIS Working Papers No. 309, May 2010: <http://www.bis.org/publ/work309.htm>
- Central Bank of Ireland, *Macro-Financial Review*, December 2016 (<http://www.centralbank.ie/stability/Pages/Introduction.aspx>).
- Cerutti, Eugenio; Stijn Claessens; and Luc Laeven: The Use and Effectiveness of Macroprudential Policies: New Evidence,” IMF Working Paper 15/61, March 2015, <https://www.imf.org/external/pubs/ft/wp/2015/wp1561.pdf>.
- Cerutti, Eugenio; Ricardo Correa; Elisabetta Fiorentino; and Esther Segalla, “Changes in Prudential Policy Instruments—A New Cross-Country Database,” IMF Working Paper 16/110. <https://www.imf.org/external/pubs/cat/longres.aspx?sk=43945.0>.
- CGFS Publications, “Credit risk transfer statistics,” No. 35, September 2009, www.bis.org/publ/cgfs35.htm.
- Chui, Michael, Emese Kuruc, and Philip Turner “A new dimension to currency mismatches in the emerging markets: nonfinancial companies,” BIS Working Papers, No. 550, March 2016, <http://www.bis.org/publ/work550.pdf>.
- Cihak, Martin “How do Central Banks Write on Financial Stability.” IMF Working Paper 06/163. See www.imf.org/external/pubs/ft/wp/2006/wp06163.pdf.
- Crowe, Christopher; Giovanni Dell'Ariccia; Deniz Igan; and Pau Rabanal, “How to Deal with Real Estate Booms: Lessons from Country Experiences,” IMF Working Paper 11/91, April 2011, <https://www.imf.org/external/pubs/ft/wp/2011/wp1191.pdf>.
- Crowley, Joseph; Plapa Koukpmou, Elena Loukoianova, and Andre Mialou, “Concentration and Distribution Measures for a Selected Set of Financial Soundness Indicators.” IMF WP 16/26. See <http://www.imf.org/external/pubs/cat/longres.aspx?sk=43706.0>.
- Dell’ Ariccia, Giovanni; Deniz Igan, Luc Laeven, and Hui Tong with Bas Bakker and Jerome Vandenbussche: Policies for Macrofinancial Stability: How to Deal with Credit Booms,” IMF Staff Discussion Note, June 2012, <https://www.imf.org/external/pubs/ft/sdn/2012/sdn1206.pdf>.
- Dembiermont Christian, Drehmann Mathias, and Muksakunratana Siriporn: “How much does the private sector really borrow - a new database for total credit to the private non-financial sector, BIS Quarterly Review March 2013. http://www.bis.org/publ/qtrpdf/r_qt1303h.pdf.

- Demekas Dimitri G. “Designing Effective Macroprudential Stress Tests: Progress So Far and the Way Forward” IMF Working Paper 15/146
<http://www.imf.org/external/pubs/cat/longres.aspx?sk=43043.0>.
- Deutsche Bundesbank, Financial Stability Review, 2015,
[https://www.bundesbank.de/Redaktion/EN/Downloads/Publications/Financial Stability Review/2015_financial_stability_review.pdf?__blob=publicationFile](https://www.bundesbank.de/Redaktion/EN/Downloads/Publications/Financial_Stability_Review/2015_financial_stability_review.pdf?__blob=publicationFile).
- Drehmann, Mathias “Total credit as an early warning indicator for systemic banking crises” *BIS Quarterly Review*, June 2013. www.bis.org/publ/qtrpdf/r_qt1306f.htm.
- Eichner Matthew; Donald Kohn; and Michael Palumbo, 2010, “Financial Statistics for the United States and the Crisis: What did they get right, what did they miss and how should they change?” Federal Reserve Board, Finance and Economics Discussion Series, <https://www.federalreserve.gov/pubs/feds/2010/201020/201020pap.pdf>.
- Ellis, Luci “Macroprudential policy, what have we learned,” Centre for Central Banking Studies, Workshop for Heads of Financial Stability, March 2013.
www.bankofengland.co.uk/research/Documents/ccbs/Workshop2013/Paper_Ellis.pdf.
- Errico, Luca; Richard Walton, Alicia Hierro, Hanan AbuShanab, and Goran Amidzic, “Global Flow of Funds: Mapping Bilateral Geographic Flows,” ISI conference, Hong Kong 2013 for a description of the global flow of funds.
www.statistics.gov.hk/wsc/STS083-P1-S.pdf.
- European Central Bank, Financial Stability Review, May 2016,
<https://www.ecb.europa.eu/pub/pdf/other/financialstabilityreview201605.en.pdf?e1a2bef79ed901d8ceae004f2fcecdd>.
- Farhi, Maryse and Macedo Cintra, Marcos Antonio, 2009 “The Financial Crisis and the Global Shadow Banking System” <https://regulation.revues.org/7473?lang=en#ftn1>.
- Fender, Ingo, and McGuire, Patrick “Bank structure, funding risk and the transmission of shocks across countries: concepts and measurement,” *BIS Quarterly Review*, September 2010, http://www.bis.org/publ/qtrpdf/r_qt1009h.pdf.
- Frecaut, Oliver “Indonesia’s Banking Crisis: A New Perspective on \$50 Billion of Losses,” *Economic Studies*, Vol. 40, Issue 1, 2004.
- Frecaut, Oliver “A National Wealth Approach to Banking Crises and Financial Stability,” IMF Working Paper 16/128.
<https://www.imf.org/external/pubs/ft/wp/2016/wp16128.pdf>.
- FSB, “Strengthening Oversight and Regulation of Shadow Banking: Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos,” August 2013.
http://www.fsb.org/wp-content/uploads/r_130829b.pdf.

- FSB, “Feasibility study on approaches to aggregate OTC derivatives data,” September 2014. http://www.fsb.org/wp-content/uploads/r_140919.pdf.
- FSB “Thematic Review on the Implementation of the FSB Policy Framework for Shadow Banking Entities,” May 2016.
- FSB, *Implementation and Effects of the G20 Financial Regulatory Reforms*, August 2016, <http://www.fsb.org/2016/08/implementation-and-effects-of-the-g20-financial-regulatory-reforms-2/>.
- FSB, *Global Shadow Banking Monitoring Report*, 2015, <http://www.fsb.org/wp-content/uploads/global-shadow-banking-monitoring-report-2015.pdf>.
- FSB, “Standards and Processes for Global Securities Financing Data Collection and Aggregation,” November 2015, <http://www.fsb.org/wp-content/uploads/FSB-Standards-for-Global-Securities-Financing-Data-Collection.pdf>.
- FSB, Basel Committee on Banking Supervision, Basel Committee on Payments and Market Infrastructure, and IOSCO, “2015 CCP Work Plan” April 2015. <http://www.fsb.org/2015/09/2015-ccp-workplan>.
- FSB/IMF, September 2015, Sixth Progress Report on the G-20 Data Gaps Initiative <http://www.imf.org/external/np/g20/pdf/2015/6thprogressrep.pdf>.
- FSB/IMF, September 2016, First Progress Report on the Second Phase of the G-20 Data Gaps Initiative, <http://www.imf.org/external/np/g20/pdf/2016/090216.pdf>
- G-20 Finance Ministers and Central Bank Governors Communique, April 2014. See <http://www.fin.gc.ca/n14/14-054-eng.asp>.
- G-20 International Financial Architecture Working Group, “2016 Final Report,” <http://www.g20.utoronto.ca/2016/P020160815362591309719.pdf>.
- G-20 Leaders Summit, The Seoul Document, November 2010. <http://www.g20.utoronto.ca/2010/g20seoul-doc.html>.
- G20 Finance Ministers and Central Bank Governors, Communiqué, March 18, 2017, <http://www.g20.utoronto.ca/2017/170318-finance-en.html>.
- Gruic, B, C Upper and A. Villar, “What does the sectoral classification of offshore affiliates tell us about risks?” December 2014, http://www.bis.org/publ/qtrpdf/r_qt1412b.pdf.
- Gruic and Wooldridge, “BIS debt securities statistics: a comparison of nationality data with external debt statistics,” Irving Fisher Committee Bulletin, No. 39, April 2015 - https://www.bis.org/ifc/publ/ifcb39w_rh.pdf.

- Heath, Robert, “Why are the G-20 Data Gaps Initiative and the SDDS Plus relevant for financial stability analysis?,” IMF Working Paper 13/6. See www.imf.org/external/pubs/ft/wp/2013/wp1306.pdf.
- Heath, Robert: “What has Capital Flow Liberalization meant for Economic and Financial Statistics.” IMF Working Paper 15/88. <http://www.imf.org/external/pubs/ft/wp/2015/wp1588.pdf>.
- Heath, Robert and Bese Goksu, Evrim, “G-20 Data Gaps Initiative II: Meeting the Policy Challenge,” IMF Working Paper 16/43, March 2016, <https://www.imf.org/external/pubs/cat/longres.aspx?sk=43760.0>.
- Hoggarth, Glenn, Carsten Jung, and Dennis Reinhardt, “Capital inflows—the good, the bad and the bubbly,” Bank of England Financial Stability Paper 40, 2016, http://www.bankofengland.co.uk/financialstability/Documents/fpc/fspapers/fs_paper40.pdf.
- IMF, “Enhancing Surveillance: Interconnectedness and Clusters.” IMF March 15, 2012. See <https://www.imf.org/external/np/pp/eng/2012/031512.pdf>.
- IMF, “The IMF’s Financial Surveillance Strategy,” August 2012. <https://www.imf.org/external/np/pp/eng/2012/082812.pdf>.
- IMF, “Macrofinancial Stress Testing—Principles and Practices,” 2012 <http://www.imf.org/external/np/pp/eng/2012/082212.pdf>.
- IMF, “The Liberalization and Management of Capital Flows: An Institutional View,” November 2102. www.imf.org/external/np/pp/eng/2012/111412.pdf.
- IMF, 2012 Review of *Data Provision to the Fund for Surveillance Purposes*, August 2012. <https://www.imf.org/external/np/pp/eng/2012/082812a.pdf>.
- IMF, “Modifications to the Current List of Financial Soundness Indicators.” 2013. <https://www.imf.org/external/np/pp/eng/2013/111313.pdf>.
- IMF, “IMF Broadens Financial Surveillance: Financial Sector Assessment Program,” IMF Survey, January 2014. See <http://www.imf.org/external/pubs/ft/survey/so/2014/POL011314A.htm>.
- IMF, 2014, Republic of Korea FSAP, <https://www.imf.org/external/pubs/ft/scr/2014/cr14126.pdf>
- IMF, 2014 Canada FSAP. <http://www.imf.org/external/pubs/ft/scr/2014/cr1429.pdf>.
- IMF, “Triennial Surveillance Review, Overview paper.” 2014, <http://www.imf.org/external/np/pp/eng/2014/073014.pdf>.

- IMF, *Global Financial Stability Report*, Chapter 2: “Shadow Banking Around the Globe: How Large, and How Risky?” October 2014.
<https://www.imf.org/external/pubs/ft/gfsr/2014/02/pdf/c2.pdf>.
- IMF, *Global Financial Stability Report*, Chapter 3: “The Asset Management Industry and Financial Stability,” April 2015.
<http://www.imf.org/External/Pubs/FT/GFSR/2015/01/index.htm>.
- IMF, Spillover Report, June 2015. <http://www.imf.org/external/np/pp/eng/2015/060815.pdf>.
- IMF Policy Paper, September 2015, “Monetary Policy and Financial Stability”
<http://www.imf.org/external/np/pp/eng/2015/082815a.pdf>.
- IMF, “Strengthening the International Monetary System—A stocktaking,” March 2016.
<http://www.imf.org/external/np/pp/eng/2016/022216b.pdf>.
- IMF, “Financial System Stability Assessment for the Central African Economic and Monetary Community.”, April 2016.
<http://www.imf.org/external/pubs/cat/longres.aspx?sk=43874.0>.
- IMF, “Global Financial Stability Report,” Chapter 3: “The Insurance Sector—Trends and Systemic Risk Implications,” April 2016,
<http://www.imf.org/external/pubs/ft/gfsr/2016/01/>.
- IMF, “Global Financial Stability Report,” Chapter 3: “Corporate Governance, Investor Protection, and Financial Stability in Emerging Markets,” October 2016,
- IMF, “The Financial Sector Assessment Program (FSAP), Factsheet,” 2016,
<https://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/16/14/Financial-Sector-Assessment-Program>.
- IMF “Tax policy, leverage and macroeconomic stability,” IMF Policy Paper, October 2016.
<http://www.imf.org/external/np/pp/eng/2016/100716.pdf>.
- IMF, Note to the G-20, April 2016, “Recent Experiences in Managing Capital Flows”
http://g20chn.org/English/Documents/Current/201608/t20160811_3127.html.
- IMF Policy Paper, “Macroeconomic Developments and Prospects in Low-Income Developing Countries—2016,” January 2017,
<http://www.imf.org/external/np/pp/eng/2016/112316.pdf>.
- IMF Policy Paper, “Capital Flows—Review of Experience with the Institutional View,” December 2016, <https://www.imf.org/external/np/pp/eng/2016/110416a.pdf>.
- IMF-FSB-BIS, “Elements of Effective Macroprudential Policies: Lessons from International Experience.” August 2016.
<https://www.imf.org/external/np/g20/pdf/2016/083116.pdf>.

- Inter-Agency Group on Economic and Financial Statistics, “Consolidation and corporate groups: an overview of methodological and practical issues.” A reference document, October 2015. <http://www.bis.org/ifc/publ/iagrefdoc-oct15.pdf>.
- Inter-Agency Group on Economic and Financial Statistics, “Update on the Data Gaps Initiative and the Outcome of the Workshop on Data Sharing,” March 2017, <http://www.principalglobalindicators.org/?sk=E30FAADE-77D0-4F8E-953C-C48DD9D14735>.
- Inter-Secretariat Working Group on Price Statistics, *Handbook on Residential Property Price Indices*, 2013, ec.europa.eu/eurostat/documents/3859598/5925925/KS-RA-12-022-EN.PDF.
- Jenkinson, Nigel and Irina Leonova, *Financial Stability Review*, Banque De France, No. 17, 2013, “The importance of data quality for effective financial stability policies, Legal entity identifier: a first step towards necessary financial data reforms,” https://papers.ssrn.com/sol3/papers2.cfm?abstract_id=2538229.
- Jobst, Andreas, Li Lian Ong, and Christian Schmieder, “Macroprudential Liquidity Stress Testing in FSAPs for Systemically Important Financial Systems,” IMF Working Paper 17/102 - <https://www.imf.org/en/Publications/WP/Issues/2017/05/01/Macroprudential-Liquidity-Stress-Testing-in-FSAPs-for-Systemically-Important-Financial-44873>.
- Kindleberger, Charles, *Manias, Panics and Crashes, A History of Financial Crises*, 1978
- Laeven, Luc and F. Valencia, (2013), “Systemic Banking Crisis Database: An Update,” IMF Working Paper/12/163. <https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Systemic-Banking-Crises-Database-An-Update-26015>.
- Lipsky, John “Macroprudential policy—What it is and how to do it,” October 2011. http://www.bfg.pl/sites/default/files/dokumenty/4_2_47_2012.pdf.
- McGuire, Patrick and von Peter, Goetz, “The US dollar shortage in global banking and the international policy response,” BIS Working Papers No. 291, October 2009: <http://www.bis.org/publ/work291.htm>.
- McGuire, Patrick, and von Peter, Goetz, “The resilience of banks’ international operations,” *BIS Quarterly Review*, March 2016. http://www.bis.org/publ/qtrpdf/r_qt1603g.pdf.
- Mehrortra, A and Yetman, J (2015), “Financial Inclusion-issues for central banks,” *BIS Quarterly Review*, March 2015. http://www.bis.org/publ/qtrpdf/r_qt1503h.pdf.
- New Zealand Treasury, *Budget Economic and Fiscal Update 2016*, <http://www.treasury.govt.nz/budget/forecasts/befu2016>.

- Obstfeld, Maurice, “Trilemmas and trade-offs: living with financial globalization,” BIS Working Papers No. 480, January 2015.
- OECD, “Results of the Survey on Shadow Banking,” October 2015, [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=COM/STD/DAF\(2015\)1&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=COM/STD/DAF(2015)1&docLanguage=En).
- Office of Financial Research, 2015, Financial Stability Report, https://www.financialresearch.gov/financial-stability-reports/files/OFR_2015-Financial-Stability-Report_12-15-2015.pdf.
- Ong, Li L. (editor), “A Guide to IMF Stress Testing: Methods and Models,” IMF, December 2014. <https://www.imf.org/external/pubs/cat/longres.aspx?sk=41117.0>.
- Osterloo and de Haan, 2004, “Central Banks and Financial Stability: A Survey,” Journal of Financial Stability, Vol 1, Issue 2, pages 257–273.
- Reinhart, Carmen M. Kenneth S. Rogoff, “*This time is different: A panoramic view of eight centuries of financial crises*,” 2009, Princeton University Press.
- Rodriguez, Pedro, “Data Provision to the IMF for Surveillance Purposes,” 2008, IMF Committee on Balance of Payments Statistics (BOPCOM-08/28) <http://www.imf.org/external/pubs/ft/bop/2008/08-28.pdf>.
- Schinasi, Garry, “Defining Financial Stability,” IMF Working Paper 04/187, www.imf.org/en/Publications/WP/Issues/2016/12/31/Defining-Financial-Stability-17740.
- Schneider, Christian, and Schumacher, Liliana, “Introduction to the Balance Sheet-Based Approach to Stress Testing,” chapter 2 of *A Guide to IMF Stress Testing: Methods and Models*. See <http://www.elibrary.imf.org/staticfiles/misc/toolkit/pdf/chap2.pdf>.
- Shrestha, Manik and Mink, Reimund, “An Integrated Framework for Financial Flows and Positions on a From-Whom-To-Whom Basis,” February 2011. See <http://www.imf.org/external/np/seminars/eng/2011/sta/pdf/whom.pdf>.
- Tarashev, Nikola, Stefan Avdjiev, and Ben Cohen, “International capital flows and financial vulnerabilities in emerging market economies: analysis and data gaps,” BIS note submitted to the G-20 International Financial Architecture Working Group, August 2016 <http://www.bis.org/publ/othp25.pdf>.
- TFFS, 2014, *External Debt Statistics Guide*, www.tffs.org/pdf/edsg/ft2014.pdf.
- Tissot, Bruno, “Derivatives statistics: the BIS contribution,” Bruno Tissot, ISI conference, Rio de Janeiro, July 2015. See https://www.bis.org/ifc/events/ifc_isi_2015/089_tissot_paper.pdf.

- Tissot, Bruno “Globalisation and financial stability risks: is the residency-based approach of the national accounts old-fashioned?” BIS Working Papers, No. 587, October 2016. See <http://www.bis.org/publ/work587.htm>.
- Tissot, Bruno, December 2015, “Closing information gaps at the global level—what micro data can bring” https://www.bis.org/ifc/events/ws_micro_macro/tissot_paper.pdf.
- Turner, Philip, “Macroprudential policies, the long-term interest rate and the exchange rate,” BIS Working Papers, No. 588, October 2016. <http://www.bis.org/publ/work588.pdf>.
- U.S. FSOC 2016 Annual Report, <https://www.treasury.gov/initiatives/fsoc/studies-reports/Pages/2016-Annual-Report.aspx>.
- White, William, “Is price stability enough?,” BIS Working Paper, No. 205, April 2006, <http://www.bis.org/publ/work205.pdf>.
- Working Group on Securities Databases, *Handbook on Security Statistics, 2015*. <http://www.imf.org/external/np/sta/wgsd/pdf/hss.pdf>.
- Zhang, Tao, Opening Remarks at the IMF-LSE Symposium on “Macroprudential Stress Tests and Policies: A Framework,” December 15, 2016. <http://www.imf.org/en/News/Articles/2016/12/15/SP121516-IMF-LSE-Symposium-on-Macroprudential-Stress-Tests-Policies-A-Framework>.