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## The Net Stable Funding Ratio: Impact and Issues for Consideration

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**IMF Working Paper**

Monetary and Capital Markets Department

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**Abstract**

As part of Basel III reforms, the NSFR is a new prudential liquidity rule aimed at limiting excess maturity transformation risk in the banking sector and promoting funding stability. The revised package has been issued for public consultation with a plan of making the rule binding in 2018. This paper complements earlier quantitative impact studies by discussing the potential impact of introducing the NSFR based on empirical analysis of end-2012 financial data for over 2000 banks covering 128 countries. The calculations show that a sizeable percentage of the banks in most countries would meet the minimum NSFR prudential requirement at end-2012, and, further, that larger banks tend to be more vulnerable to the introduction of the NSFR. Additionally, by comparing the NSFR to other structural funding mismatch indicators, we find that the NSFR is a relatively consistent regulatory measure for capturing banks' funding risk. Finally, the paper discusses key policy issues for consideration in implementing the NSFR.

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## I. INTRODUCTION

The 2007–08 global financial crisis exposed shortcomings in the management of market liquidity and funding risk in individual banks, with significant consequences for system-wide financial stability. Banks’ asset and liability structures proved to be highly vulnerable to market shocks, investor runs and breakdowns in wholesale funding markets. This in part reflected banks’ increasing reliance on short-term wholesale funding as means to grow their balance sheets over the past 20 years. They relied less on own capital raising efforts, traditional monetary liabilities, such as insured and non-insured deposits, while at the same time invested more of these borrowed funds in assets that proved to be less liquid.

In response, regulators have stepped up their efforts to rein in banks’ excess liquidity risk exposures. Under its new international regulatory framework for banks, known as Basel III, the Basel Committee on Banking Supervision (BCBS) issued two quantitative liquidity standards in 2010—the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). It is the first time that the BCBS is requiring liquidity risk standards to be implemented consistently across jurisdictions. The review of the LCR framework, which requires banks to hold enough high quality liquid assets (HQLA) to overcome a liquidity stress over 30 days, was completed in early 2013, and now most jurisdictions are in the stage of issuing consultation papers.<sup>1</sup>

The reform focus has shifted to finalizing the calibration of the NSFR, but considerable concerns have been raised against it. The NSFR, which is expected to go into effect in January 2018, aims to encourage banks to hold more stable and longer term funding sources against their less liquid assets, thereby reducing maturity transformation risk.<sup>2</sup> The main arguments against the NSFR are that: (i) it may be too restrictive and undermine banks’ traditional role in liquidity and maturity transformation, and could lead to a shortage in long-term lending with real consequences for economic growth; (ii) it could make deposits less stable as banks compete for this scarce funding source; (iii) it may encourage maturity transformation activities to migrate to the “shadow banking” sector and hence not address systemic risk; (iv) it could have a more severe impact on emerging markets and developing economies (EMDEs), which tend to have less developed capital markets and rely more on

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<sup>1</sup> The financial crisis and difficulties experienced by several banks in accessing funding markets and managing liquidity risk also spurred the BCBS to strengthen prudential guidance and monitoring of liquidity risk management (See BCBS, 2010).

<sup>2</sup> The NSFR is defined as a bank’s available stable funding (ASF) divided by its required stable funding (RSF), with banks having to meet at minimum a regulatory ratio of 100 percent beginning 2018. ASF is the portion of a bank’s funding structure that is reliable over a one year time horizon, while the RSF is the portion of a bank’s assets and off balance exposures that are viewed as illiquid over a one year horizon and hence should be backed by stable funding sources (see discussion in Section III).

banks for long-term financing; and (v) it could affect disproportionately those EMDEs that have large global bank presences, if these banks have a significant NSFR shortfall.

Some of these concerns are partly fueled by the lack of familiarity with the NSFR as a new micro prudential measure. Most of the semi-annual Quantitative Impact Studies (QIS) conducted by the BCBS only cover a small sample of banks in its member jurisdictions (223 banks in 27 member countries). This limits an informed discussion on the impact of the NSFR on a wide range of banks and jurisdictions with less developed capital markets and more concentrated financial systems where banks play a critical role in financial intermediation and maturity transformation. Furthermore, the NSFR is a new prudential measure that looks fairly complicated and mechanistic when compared to other structural measures of maturity transformation risk such as loan to deposit ratios.<sup>3</sup> Many analysts are also unsure whether the weights assigned to assets and liabilities reflect appropriate liquidity risk assumptions. Hence, it is difficult to foresee how the new measure will impact different banking systems, particularly for those supervisors who have not been involved in the discussion of formulating the NSFR.

This paper aims to address this knowledge gap by calculating the NSFR for a large set of banks across a large number of countries using publicly available information and examine the implications for countries of introducing the NSFR. The calculation uses bank financial data for 2012 (or more updated, when available) and the latest NSFR weights and calibrations issued for consultation in January 2014 by the BCBS. It further explores whether the NSFR produces results that could be highly disruptive to banks and their role in maturity transformation in the financial system, or if NSFR is a good prudential tool for assessing excessive maturity mismatch in banks' balance sheets.

The next section provides a background discussion as to why banks are exposed to maturity transformation risk. Section III describes the design of the NSFR as proposed by BCBS. Section IV discusses the pros and cons of having a prudential minimum requirement for limiting vulnerabilities in banks' funding structures. Section V explains the method and the results for calculating the NSFR across a wide range of countries. It also compares the NSFR to other potential prudential indicators of maturity mismatch. Section VI identifies policy measures that may help mitigate potential transitional costs in the implementation of the NSFR. The final section concludes.

## **II. MATURITY TRANSFORMATION RISK**

Banks are inherently exposed to funding liquidity risk arising from their funding structures and the maturity mismatch in their balance sheet. Banks play a central role in liquidity and

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<sup>3</sup> In contrast, the Basel capital standards have evolved over time from a very simple accounting measure and similar measures were widely used among supervisors before its introduction.

maturity transformation in the financial system: they typically borrow money on demand or sight, and provide savers short-term deposit-like facilities; they also lend most of this longer term, especially in the form of illiquid assets such as residential mortgages. Liquidity risk arises on both sides of the balance sheet: if either the liquidity generated from selling liquid assets, or from securitizing assets, or the liquidity available from various funding sources is insufficient to meet cash obligations as they fall due. Maturity transformation inherently exposes banks to investor and/or deposit runs, with implications for bank solvency and bank survival (Diamond and Dybvig, 1983).

Indeed studies have shown that excessive maturity transformation risk can be a major source of bank failure.<sup>4</sup> A recent IMF study, for example, finds that a higher loan to deposit ratio is linked to higher bank distress in both advanced and emerging market countries, and that a higher share of short-term debt as percent of total liabilities is associated with banking distress.<sup>5</sup> Yorulmazer (2008) finds that banks that relied more on wholesale funding were more vulnerable to bank distress following the collapse of the U.K.'s largest mortgage bank, Northern Rock.<sup>6</sup> In a more recent study, Vazquez and Federico (2012) find that global banks with lower capital buffers (or higher leverage ratio) and excessive structural funding mismatches were more likely to fail. All in all, most of these studies find that funding structures matter (overreliance on short-term wholesale funding), but that other factors play a role, including macroeconomic conditions (e.g., overheating and asset bubbles). In addition, these studies indicate that adequate capital buffers lower the risks of a bank failure. These findings lend support to the Basel III regulations issued by BCBS to strengthen capital buffers and lower excessive maturity mismatch risk within banks.

While liquidity risk management has long been recognized by supervisors as important to banks, they have generally taken Pillar 2-like approaches rather than hard Pillar 1-like rules.<sup>7</sup> As such, there were no global regulatory quantitative standards governing liquidity risk prior to the global financial crisis. Most of the supervisory guidance on banks' liquidity risk management was to subject banks to some form of reporting requirements on maturity mismatch as well as some forms of qualitative requirements on liquidity risk management.<sup>8</sup>

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<sup>4</sup> Gorton and Metric (2012), Brunnermeier and Oehmke (2013), Ratnovski and Huang (2010), and Shleifer and Vishny (2010) show that reliance on wholesale funding can be a source of destabilization in banking.

<sup>5</sup> IMF (2013).

<sup>6</sup> For more country studies, see Rozhkov (2008) who examines factors behind Australian banks' resilience during the global financial crisis, and Ratnovski and Huang (2009) who examine Canadian banks' resilience, respectively.

<sup>7</sup> BCBS issued "Sound practices for Managing Liquidity in Banking Organization" in 2000 and updated this in 2008. This effectively defined internationally-agreed qualitative requirements for liquidity risk management, which can be applied through the Pillar 2 process in the Basel II framework.

<sup>8</sup> In maturity analysis, each bank is required to use maturity mismatch ladders to compare cash inflows and outflows typically on a daily basis and over a series of defined time-bands. The maturity mismatch ladder shows the net future cash flows of a bank's operations in various time-bands. A bank's net cash flow and funding

(continued)

In the absence of an international regulatory quantitative standard, some national authorities developed Pillar 1-like rules (Box 1). Indeed, many countries had some form of quantitative standards to address short-term liquidity risks, such as subjecting banks to reserve requirements or liquid asset requirements, mainly to cope with short-term market liquidity and funding stress periods. By contrast, regulators have been more reluctant to set structural limits on banks' maturity transformation, in particular beyond 1 month, although some countries have had limits on loan to deposit ratios or restrictions on types of funding instruments (e.g., New Zealand introduced in 2009 a minimum core funding ratio and Korea introduced a price-based levy on banks' foreign currency wholesale borrowing).

Supervisors relied also heavily on banks for liquidity risk management. Most global banks had relatively elaborate liquidity risk management frameworks in place. This included frequent market liquidity stress testing, internal loan to deposit limits, and others indicators including: market sourced funding to managed assets; short-term funds dependence, stable assets to stable funding; and 7/30/90 day crisis liquidity coverage ratios.<sup>9</sup> However, these were generally not applied consistently across the banking group. The crisis also showed that banks were exposed to hidden liquidity risks in their balance sheet. For instance, assets that appeared liquid under normal market conditions quickly became illiquid once market conditions deteriorated and overreliance on certain types of wholesale markets (i.e., high concentration in funding sources) made banks vulnerable to sudden investor runs. The case of Northern Rock is illustrative and frequently used as example of an individual institution that mismanaged maturity transformation risk by almost exclusively relying on one funding model—securitization to fund a relatively illiquid residential mortgage book. The bank was of the view that it had a diversified and stable funding base as it securitized its mortgages in the domestic and global markets. However, the bank's business model became obsolete by mid-2007 as the securitization problems that started in the U.S. spread to the global securitized market and investors shunned anything to do with mortgages.

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requirements are determined by analyzing its present and future cash flows at elected maturity dates, based on assumptions of the behavior of assets, liabilities and off-balance sheet items. Calculations will include the cumulative net excess or shortfall over the time frame of the liquidity assessment. Most commonly, the emphasis is on short and medium term, the period up to one month and one month to one year, respectively. The period of up to one year is important as it may provide an early warning of potential liquidity problems and useful information from which to base strategic decisions for future funding sources.

<sup>9</sup> See Matz and Neu (2007) for a more in-depth discussion of global liquidity risk management practices and how they have evolved among the top global banks.

### **Box 1. Existing Quantitative Regulatory Requirements on Bank Funding Structures**

Unlike minimum capital requirements, quantitative liquidity standards focusing on long-term stability of bank asset and funding structures were not applied internationally by banking supervisors. Most supervisors in advanced economies have been reluctant to impose quantitative standards on banks' longer term maturity transformation risk. Instead, in these economies, most quantitative liquidity requirements have tended to focus on short-term liquidity risk, such as minimum reserve requirements or minimum liquid asset holding requirements. In contrast, supervisors in emerging market and developing economies have often used limits on loan to deposit (LTD) ratios. A LTD ratio, by restricting how much lending a bank can make in relation to its deposits, provides some assurance that loans are financed by relatively stable funding. For example, reports on compliance with Basel Core Principles Assessments published by the IMF indicate that countries like China (75 percent), Saudi Arabia (85 percent), Indonesia and Nigeria (80 percent) use the LTD ratio as qualitative minimum requirement for managing longer-term liquidity risk.

The LTD ratio, however, has its drawbacks as it is too narrow a measure to capture the risk in a bank's funding structure as the bank's business develops. For example, on the asset side, it usually does not cover a bank's holding of securities or off-balance sheet items, which can be illiquid. If these positions are funded by unstable short-term funding such as through interbank borrowing, it could easily destabilize the bank's long-term liquidity. Similarly, the stability of deposits cannot be taken for granted as different kinds of deposits could have substantially different stability characteristics. A large deposit or deposits from banks and other financial institutions tend to be less stable than small deposits from retail or SME customers. The LTD ratio also does not account for a banks' ability to raise long-term borrowed funds.

For this reason, an idea of the core funding ratio (CFR) was developed by some countries immediately after the global financial crisis. New Zealand, concerned with the heavy reliance of its banking system on overseas short-term funding, started to develop a quantitative requirement for banks' structural funding, and a proposal for CFR was made by the New Zealand Reserve Bank in October 2008.<sup>10</sup> The "core funding" includes the equity of the bank, all funding with a remaining maturity of over one year, a portion of deposits with shorter than one-year maturities, and 50 percent of the funding by transferable securities issued by the bank with remaining maturities of more than two years. For deposits with shorter maturities, the smaller the size, the higher the percentage of the deposit that can be counted as core funding (90 percent for deposits up to 5 million NZD and 20 percent for those more than 50 million NZD). The ratio was formally put in place as a minimum requirement for banks from April 2010 at 65 percent and the ratio was gradually raised to 75 percent. Also, in March 2009, the U.K. Financial Services Authority (FSA) discussed the introduction of the CFR to address structural funding imbalances in banks. The report did not propose a specific definition of the ratio, but for illustrative purposes it was calculated as the ratio of retail deposits and long-term funding to total liability.<sup>11</sup> The major difference between the CFR and the NSFR is that while the NSFR tries to capture the need for stable funding for different kinds of assets, the CFR only requires stable funding against total loans and advances. As a result, some illiquid assets that need to be financed by stable funding, such as a complex derivative product, would be ignored in the CFR.

<sup>10</sup> See Reserve Bank of New Zealand (2009).

<sup>11</sup> See U.K FSA (2009).



### III. THE DESIGN

The NSFR is a structural prudential measure of maturity transformation risk, based on the recognition that private incentives to limit excessive reliance on unstable funding are weak. It intends to capture the proportion of banks' assets that are considered less liquid such as long-term loans with over one year maturities that are funded by shorter term funding of less than one year, or funding sources that are considered less reliable and stable. Thus, it complements the LCR, which looks at liquidity at the shorter end of maturities—less than 30 days.

The ratio is defined as a bank's available stable funding (ASF) divided by its required stable funding (RSF), with banks having to meet at minimum a regulatory ratio of 100 percent beginning 2018. ASF is the portion of a bank's funding structure that is reliable over a one year time horizon, while the RSF is the portion of a bank's assets and off balance exposures that are viewed as illiquid over a one year horizon and hence should be backed by stable funding sources. As such the measure is intended to support the institution as a going concern for at least one year if it is subject to firm-specific funding stress. In theory, this would lower a bank's probability of liquidity runs and associated default.

The ASF and RSF weights range from 100 percent to 0 percent to reflect the stability of funding for liability categories and the liquidity of asset categories. A higher ASF weight is attached to more stable funding. For example, regulatory capital enjoys a 100 percent ASF weight while stable non-maturity deposits receive a 95 percent ASF weight. In contrast, funding from a financial institution with residual maturity less than six months has a 0 percent ASF. Similarly, liquid assets enjoy lower RSF factors while illiquid assets are assigned higher RSF factors. Central bank reserves have a 0 percent RSF weight and performing loans are assigned a 85 percent RSF weight. Funding from the central bank or other financial institutions (secured and unsecured) with residual maturity of 6 months and less than one year received an ASF factor of 50. Some classifications of asset and liability categories use definitions already established by Basel standards. The definition of "stable" deposits is the same as in the LCR, and the categorization of HQLA in the LCR is used to determine RSF factors. Furthermore, risk weights under the standardized approach for credit risk in the Basel capital framework are used to determine loans that can enjoy lower RSF factors (see Annex 1 for details on calibration and weights).

The design of the NSFR has changed since its initial proposal in December 2010, with some of the revisions expected to help improve the NSFR for most banks (Figure 1). The original proposal on the NSFR was made in 2009 and, together with the LCR, was included in the agreed text published in December 2010. At that time, it was agreed to make the necessary revisions to address any unintended consequences before the new rule comes into effect. The BCBS continued working on revising the NSFR after it completed the revision on the LCR in early 2013. These revisions are captured in the consultation paper published in January 2014, with the main changes: a new category of assets and liabilities (secured and unsecured) with remaining maturities between 6 months and one year in part to reduce cliff effects; an

improvement in the alignment with the LCR by using its HQLA definitions for determining RSF weights; and, adjustments in the calibrations including increasing ASF for deposits.<sup>12</sup>

The BCBS has been conducting QIS semi-annually to assess the impact of the NSFR, but the coverage has been limited. The QIS undertaken by the BCBS covers large banks in BCBS member countries and is conducted using end-June and end-December financial data. The latest published result based on end-December 2012 data covers 223 banks in 27 BCBS member countries.<sup>13</sup> Regarding NSFR calculations under QIS, 53 percent of covered banks meet the requirement of 100 percent NSFR, and the average NSFR for Group 1 banks is 99 percent and for Group 2 banks is 100 percent.<sup>14</sup> However, this calculation is based on the calibration before the latest revision.<sup>15</sup>

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<sup>12</sup> BCBS (2014)

<sup>13</sup> BCBS (2013).

<sup>14</sup> Group 1 banks are those that have Tier 1 capital in excess of Euro 3 billion and are internationally active, while all other banks form part of Group 2.

<sup>15</sup> The QIS report of March 2014 used end-June 2013 bank data and does not account for changes made to the calibration as published in the January 2014 consultation report.

Figure 1. NSFR Changes Since 2010<sup>1</sup>

<b>ASF</b>	<b>Dec 2010</b>	<b>Jan 2014</b>	<b>Effect</b>
Capital, hybrid, and long term wholesale funding	100%	100%	↔
Stable deposits	90%	95%	↑
Less stable deposits	80%	90%	↑
Operational deposits	0%	50%	↑
Wholesale funding 6m-1y	0%	50%	↑
<b>RSF</b>	<b>Dec 2010</b>	<b>Jan 2014</b>	<b>Effect</b>
Central bank reserves, cash, banknotes, and unencumbered loans to banks < 6m	0%	0%	↔
Unencumbered HQLA securities < 1y	0%	5%	↑
Unencumbered Level 2a and 2b securities ≥1y	20/50%	15/50%	↔
Encumbered HQLAs 6m - 1y	0%	50%	↓
Non HQLA securities and non renewable loans to NBFIs with RM < 1y	0%	50%	↓
Wholesale lending (6m-1y)	0%	50%	↓
Unencumbered loans to retail and SMEs (with RW ≤ 35% under SA and RM of < 1y)	65%	50%	↑
Unencumbered loans to retail and SMEs (with RW > 35% under SA and RM of < 1y)	85%	50%	↑
Unencumbered loans to large corporates, government, PSEs with RM of < 1y	50%	50%	↔
Unencumbered loans with RW ≤ 35% under SA with RM ≥ 1y)	65%	65%	↔
Unencumbered residential mortgages (with RW ≤ 35% under SA with RM ≥ 1y)	65%	65%	↔
Other unencumbered performing loans (with RW > 35% under SA with RM ≥ 1y)	100%	85%	↑
Encumbered assets for 1 year or more	100%	100%	↔
Encumbered Non HQLA securities with RM ≥ 1y	100%	100%	↔

Source: BCBS (2010 and 2014) and staff estimates.

<sup>1</sup> The sign of the NSFR effect is an assessment of the impact of a change in one factor, while holding all else constant. For instance, an increase in the ASF factor for stable deposits from 90 to 95 percent, with all other components and factors of a bank's balance sheet unchanged, should help improve a bank's NSFR.

#### IV. GLOBAL NSFR: PROS AND CONS

The NSFR is a microprudential regulation aimed at incentivizing individual banks to choose asset and liability structures that are viewed as stable and sound from a risk management perspective. A well calibrated NSFR should contribute to enhancing the stability of banks and the system on the whole. Broadly, the NSFR aims at discouraging certain banking practices that are considered financially unsound, including excessive liability and asset concentrations and mismatch, and lowering reliance on instruments that are highly volatile and procyclical.<sup>16</sup> The NSFR should help discourage banks' over-reliance on short-term wholesale funding (less than one year) and encourage greater mobilization of stable sources such as deposits or bond market financing, or even capital. In its calibration and intent, the

<sup>16</sup> As it is a micro prudential by design and targets the financial stability of an individual institution, the NSFR may not fully address all the negative externalities that one bank may pose on other banks in the system, although it will lower the likelihood of systemic liquidity risk materializing by also mitigating funding and counterparty interconnectedness (Arregui, Norat, Pancorbo and Scarlata 2013. See also Perotti and Suarez (2009) and Jobst (2012) for policy options to address systemic liquidity risk.

NSFR takes on many aspects of traditional industry liquidity risk management practices, including balance sheet liquidity analysis and cash capital position.

The NSFR should help address some shortcomings in the supervisory approach to liquidity risk management that emerged as a key issue from the financial crisis. In some of the countries affected by the crisis, supervision proved not to be as effective as it should have been. In particular, in good and exuberant times, it has proven to be difficult for supervisors to become the naysayers to the banks that they supervise and to proactively push them to take effective, timely actions that may appear unpopular at the time.<sup>17</sup> The crisis showed that supervisors leaned perhaps too much on bank management for liquidity risk management. Supervisors also did not fully understand the liquidity risk implications that resulted from banks forays into more complex financial products, such as derivatives and securitizations and structured vehicles, and their growing reliance on short term wholesale funding, including from offshore and new counterparties. Furthermore, reliance on market discipline turned out to be misplaced in some cases as an effective tool of supervision. Bank managers and directors in retrospect failed to put in place adequate prudential risk monitoring and controls systems. Institutional investors did not do their own due diligence and relied on rating agencies and rating agencies were unable to detect vulnerabilities early enough, which might reflect the conflicts of interest in their business models, providing incentives to overrate products and clients. In sum, at all levels there was insufficient understanding of key business drivers and flaws in liquidity risk management practices.

Against this backdrop of some supervisory weaknesses, the NSFR should empower supervisors to act. In theory, without quantitative requirements, supervisors can exercise their general supervisory powers to require banks to change their funding structure. But, in practice, supervisory action could be enhanced in forcefulness and timeliness if backed by an explicit quantitative regulatory minimum. As regulations can always be circumvented, supervisory attention is still needed on the overall structural funding risk situation of the bank. There are also risks associated with excessive reliance on rules: they can be backward looking and not properly take into account financial innovation or engineering, thus failing to timely identify major risks. Enforcement powers of supervisors are also equally necessary to ensure that essential minimum standards are met and that the overall regulatory and supervisory regime has credibility. The IMF's work in assessing compliance with financial sector standards over the past decade in the context of FSAPs suggests that significant work remains to be done in many countries to strengthen supervision.<sup>18</sup> Many EMDEs have yet to develop the supervisory judgment, powers and capacity to identify risks that are crucial for effective supervision.

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<sup>17</sup> See IMF (2010a).

<sup>18</sup> See IMF (2010b).

The NSFR should also help promote consistent and harmonized liquidity risk reporting systems on maturity mismatch of assets. This should help enforce market and regulatory discipline. Disclosure requirements would increase significantly and banks would have to provide consistent reporting templates on liquidity risk exposures. To enhance market standing, banks should be encouraged to provide modeling and behavioral assumptions on their maturity mismatch analysis and NSFR reporting. This would facilitate more effective and timely risk identification by markets and supervisors and improve banks' internal liquidity risk management control system. Having this data would allow supervisors to compare funding mismatch risks across banks (peer group analysis) and jurisdictions. It would significantly improve supervisory monitoring and the understanding of structural funding mismatch and soundness of banks.<sup>19</sup> Further it would help develop a view of emerging liquidity and funding risk at the institutional and system-wide level.

Despite these advantages, there has been considerable pushback by the industry and some supervisory and regulatory authorities on introducing the NSFR. The main arguments against it have been that the rule is: structural in nature and could be potentially intrusive to the role of traditional banking in liquidity/maturity transformation; could impair banks' ability to support financial intermediation and harm investment activity and economic growth. In addition, it has been argued that banks facing a large NSFR gap—that is a shortage of stable funding sources—could cut back on long-term financing or shorten the maturity of their loans to less than one year, with consequences for financial stability.

Some concern has further been raised that the impact on EMDE countries could be severe. These countries tend to have less developed capital markets and financial intermediaries (other than banks) and therefore would suffer more if their largest banks would have to cut back on long-term funding to close the NSFR gap. There are also worries that countries that have a large disproportionate presence of global banks, which may have a NSFR shortfall, may be more impacted than others, if there is a significant home bias in banks' balance sheet allocation decisions. There is also concern that supervisors should not rely excessively on the NSFR, as it only captures excessive maturity transformation risk up to one year. The NSFR, for instance, does not assign more punitive RSF factors to banks' loans or other illiquid assets with residual maturity of 20 or 30 years relative to 1 year. Both are given equal RSF weights.

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<sup>19</sup> The BCBS plans to publish the NSFR disclosure requirements in 2015 once the NSFR has been finalized.

## V. CALCULATIONS AND IMPACT

### A. Methodology

The NSFR calculations were approximated using publicly available data for the largest global 100 banks (ranked by asset size) and for the largest banks in 128 countries.<sup>20</sup> The calculations used the proposed weights according to the Basel III liquidity framework issued in January 2014.<sup>21</sup> Data was collected from 2,079 locally incorporated banks (see Annex 2 for the number of banks by country and a comparison to the number of banks and countries included in the BCBS QIS) with the aim to cover countries at different stages of economic and market development. The data set only includes banks that are deposit taking.<sup>22</sup>

Given the lack of standardized and granular liquidity risk reporting across banks and jurisdictions, several assumptions had to be made in generating the calculations. A bank's asset and liabilities (on and off balance sheet) were transformed into the NSFR applying weights and assumptions uniformly and consistently across the various categories (see Figure 2 and, for more detail, Annex 3). Loans were treated relatively conservatively, with all loans assumed to have a maturity of more than 1 year and hence a RSF weight of 85 percent. The methodology further distinguished the liquidity risk of securities based on the revised Basel III liquidity requirements (i.e., Level 1, and Level 2a and 2b). Banks' reported holdings of government securities were treated with a RSF factor of 5 percent, consistent with the revised Basel III NSFR. Other securities in AFS and trading portfolio (e.g., equities, commodities, and corporate) were given a 50 percent RSF weight.<sup>23</sup> Customer deposits were differentiated, where available, between current, term, and savings deposits. Derivatives were treated on a net basis (receivables less payables) and assigned a RSF weight of 100 percent if there was a positive net balance, and a weight of 0 percent otherwise. Hybrid instruments that have debt-like features were treated as long-term funding instruments.

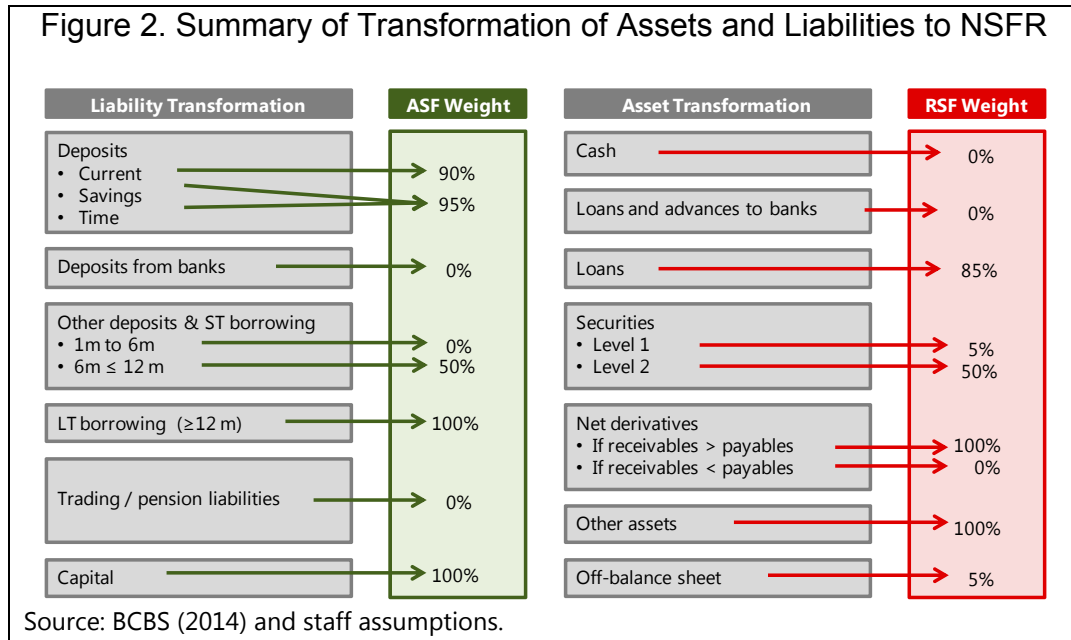
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<sup>20</sup> Annual bank balance sheet data from Bankscope for end-2012 was used. Data is expressed in U.S. dollars and reported on a consolidated basis. The latter is consistent with the application of the Basel III liquidity rules. Selective comparisons were made with a number of banks' annual financial statements to gather further information and to cross check the validity and accuracy of the Bankscope data. Generally the NSFR calculations conducted in the paper cannot be compared with the BCBS QIS calculations. The latter rely on bank's prudential returns provided to national regulators, and these tend to be more granular. Also, banks categorize the components based on behavioral assumptions, including on the stability of retail and SME deposits.

<sup>21</sup> See BCBS (2014).

<sup>22</sup> Development banks and postal saving banks were excluded. Specialized institutions, such finance companies and investment banks or specialized mortgage institutions that report deposits were included.

<sup>23</sup> Banks' financial statements do not provide details on assets that are encumbered and unencumbered nor a detailed breakdown of HQLAs such as Level 1, Level 2a and Level 2b assets consistent with the LCR framework. Basel III NSFR treats assets (such as residential mortgages) that are encumbered for one year or more with 100 percent RSF weight. Assets encumbered for a period of 6 months or more and less than one year, receive a 50 percent RSF weight. Encumbered assets include but are not limited to assets backed securities-covered bonds, or repos.



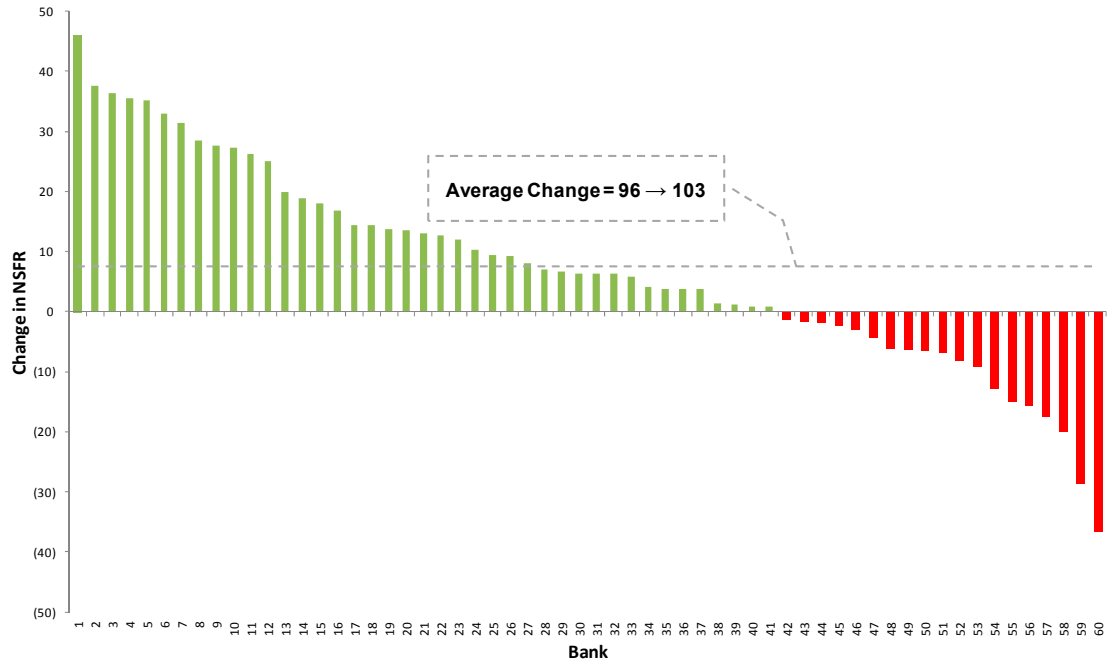
## B. Impact of Revisions to Design

The revisions by the BCBS since 2010 have helped improve the NSFR for most banks. IMF staff undertook a similar quantitative exercise using end-2009 data.<sup>24</sup> The NSFR was then calculated for the 60 largest global banks, using the proposed 2010 BCBS methodology. Comparing the 2010 versus the 2014 BCBS NSFR methodology shows that the calculated NSFR at end-2009 for the 60 banks averages 96 percent, with 29 of the banks experiencing a shortfall. Using the same data points, but applying the revised 2014 methodology, the average NSFR improves by 7 points from 96 to 103 percent, although the number of banks below 100 remains roughly the same (Figure 3). However, for 12 banks with a shortfall in both cases, their NSFR improves using the revised methodology. The key factor contributing to the improvement has been the change in the ASF factor for deposits.

<sup>24</sup> See IMF (2011).

Figure 3. NSFR Methodological Comparison

**NSFR Change: 2010 methodology vs. 2014 Methodology**  
(Percentage points)



Sample includes 60 global banks analyzed by the GFSR in April 2011.  
Represents end-2009 reported figures.

### C. Global Systemically Important Banks

Using the 2014 proposed BCBS methodology, the calculated NSFR for the 28 global systemically important banks (G-SIBs) shows that their NSFR distribution has narrowed and their average NSFR has improved (Figures 4a and 4b).<sup>25</sup> This suggests that the G-SIBs have made progress in addressing their structural funding vulnerabilities. For these banks, their NSFR deteriorated prior to the global financial crisis, with many resorting to short-term wholesale funding to expand their balance sheet, including investing in illiquid assets, but has improved steadily since. On average, the NSFR rose from 97 percent at end-2007 to 113 percent at end-2012, and continued to increase through the first half of 2013, rising to 117 percent. This reflects mainly efforts to strengthen deposit mobilization and raise capital and long-term funding, visible in the steady rise of the ASF, while the RSF remained largely unchanged. The impact on the NSFR from divestment of their investment banking exposures

<sup>25</sup> The 28 banks include all banks in the FSB's G-SIB list, except for Goldman Sachs. See FSB (2013).



(e.g., fixed income, commodities and currencies) by some G-SIBs is less clear cut, as some of this is matched and funded through short-term liabilities.

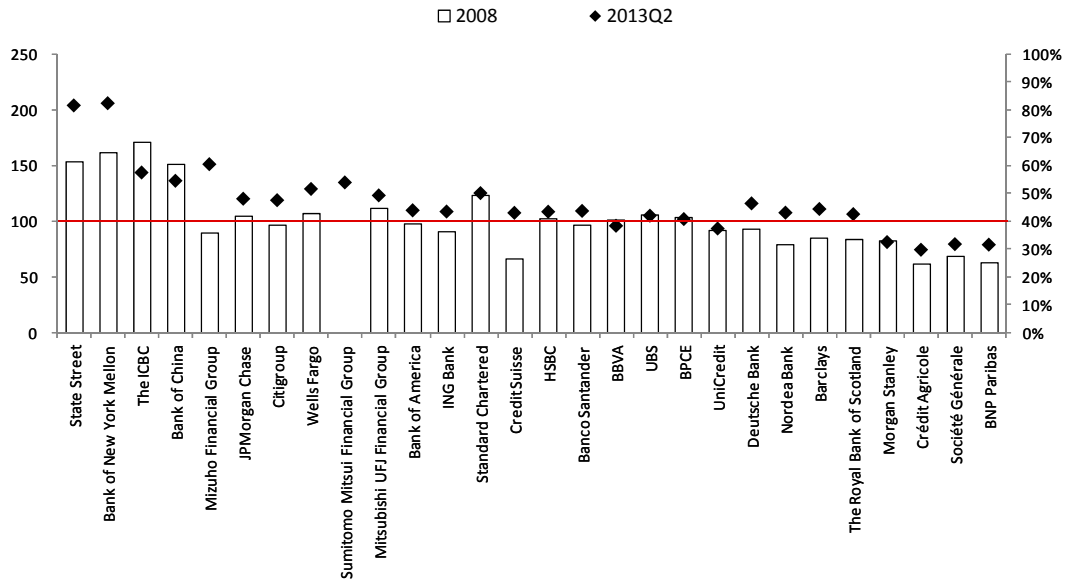
Calculations generally suggest that certain G-SIB business models or G-SIBs by regions are less likely to face excessive maturity mismatch risk. In particular, more specialized banks such as custodian banks or those that rely mainly on local subsidiaries with a strong franchise business to mobilize deposits to fund credit have a higher NSFR. By contrast, those G-SIBs that have a more mixed business model, including a strong investment banking arm, are more likely to have an NSFR below 100.<sup>26</sup> Chinese G-SIBs are also more likely to have a high NSFR partly because they face already a regulatory limit on loan to deposit, and have not used their large domestic deposit franchise to actively expand internationally or venture into investment banking.

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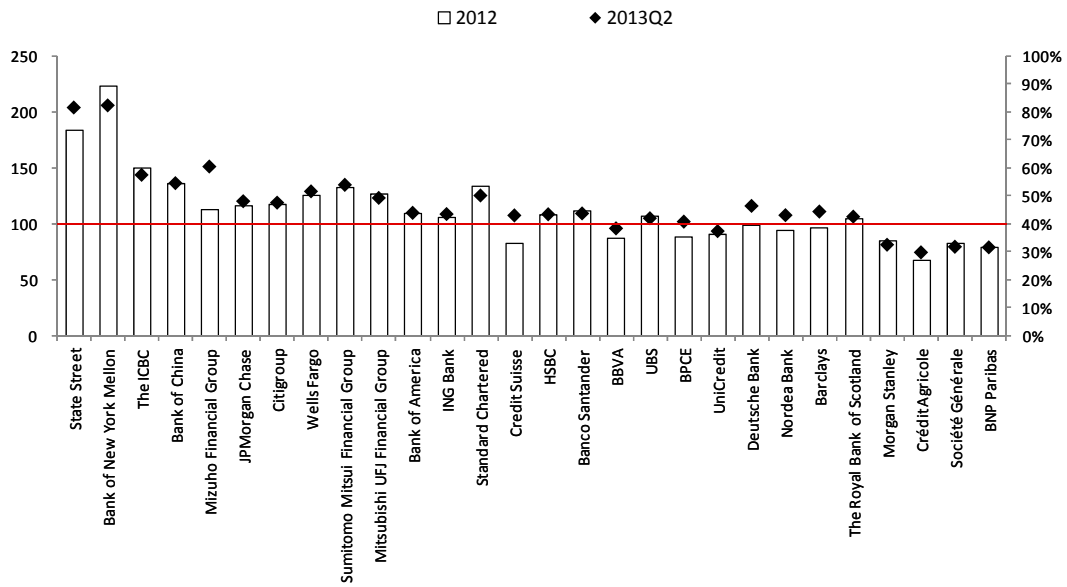
<sup>26</sup> The type of business model that is more vulnerable to taking on excessive maturity mismatch risk was not the aim of this study and could be explored further. The BCBS in its updated QIS did not find a statistical significant variation across business models.

Figure 4a. NSFR Trends Among Global Systemically Important Banks

**Change in NSFR for GSIBs, 2008 vs. 2013Q2**  
(NSFR)



**Change in NSFR for GSIBs, 2012 vs. 2013Q2**  
(NSFR)



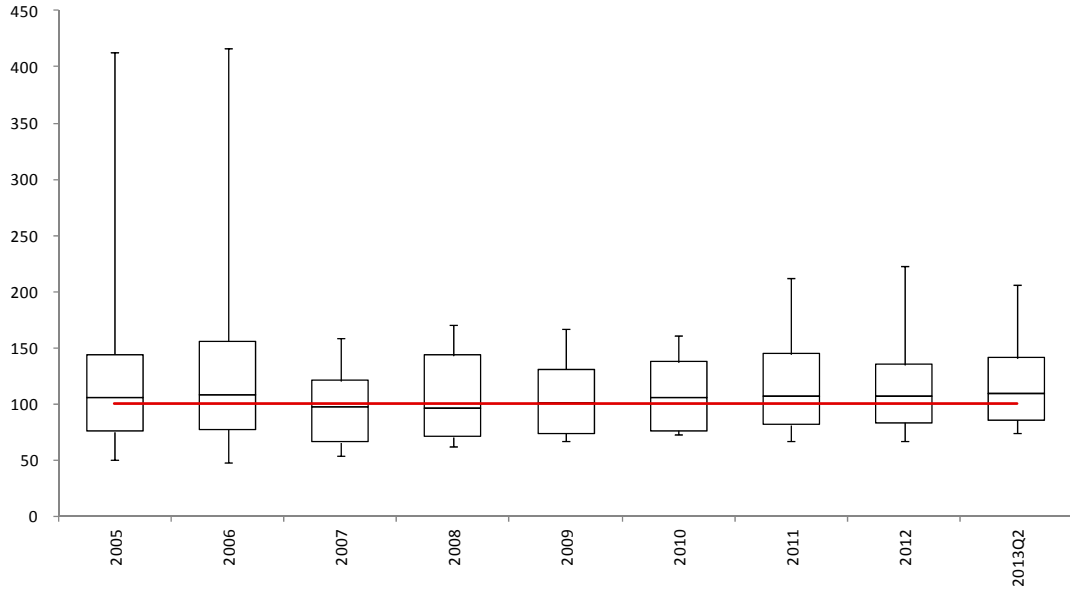
Source: BankScope; staff calculations.

The horizontal maroon bar in the top figure indicates the 100 percent NSFR threshold.

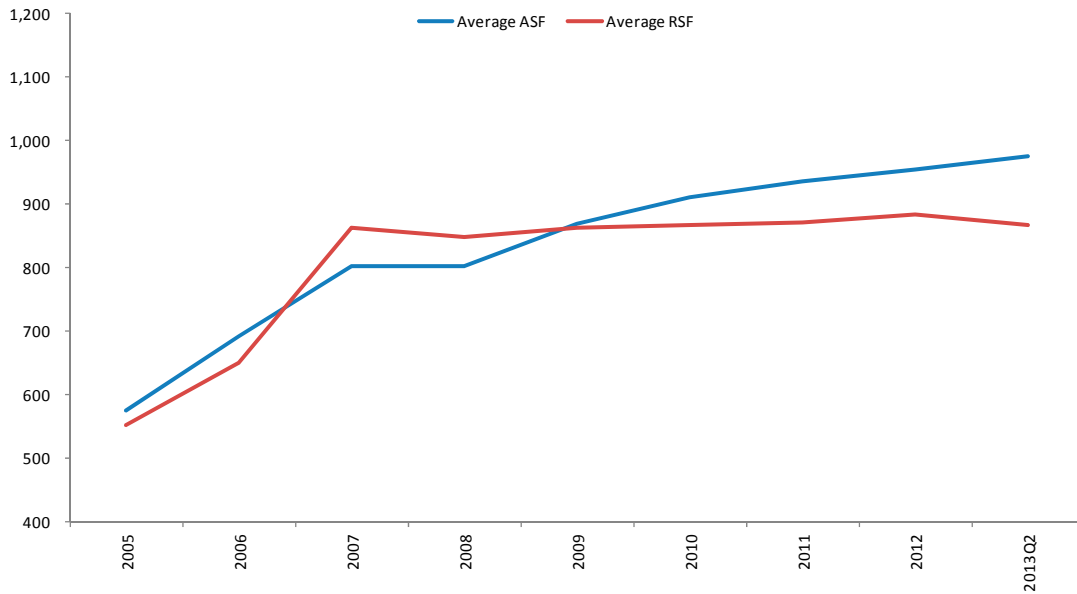
Note: the financial accounts of overseas subsidiaries and affiliates for Sumitomo Mitsui Financial Group were not consolidated until FY2009.

Figure 4b. NSFR Trends Among Global Systemically Important Banks (cont.)

**GSIB NSFR Distribution from 2005 to 2013Q2**  
(NSFR)



**Average GSIB ASF and RSF from 2005 to 2013Q2**  
(\$U.S. in billions)



Source: BankScope; staff calculations.

The horizontal maroon bar indicates the 100 percent NSFR threshold.

#### D. Cross Country Comparison

The NSFR was calculated for 128 countries, and included only countries for which bank data covered at least 50 percent or more of system-wide bank lending.<sup>27</sup> The calculations yielded the following results:

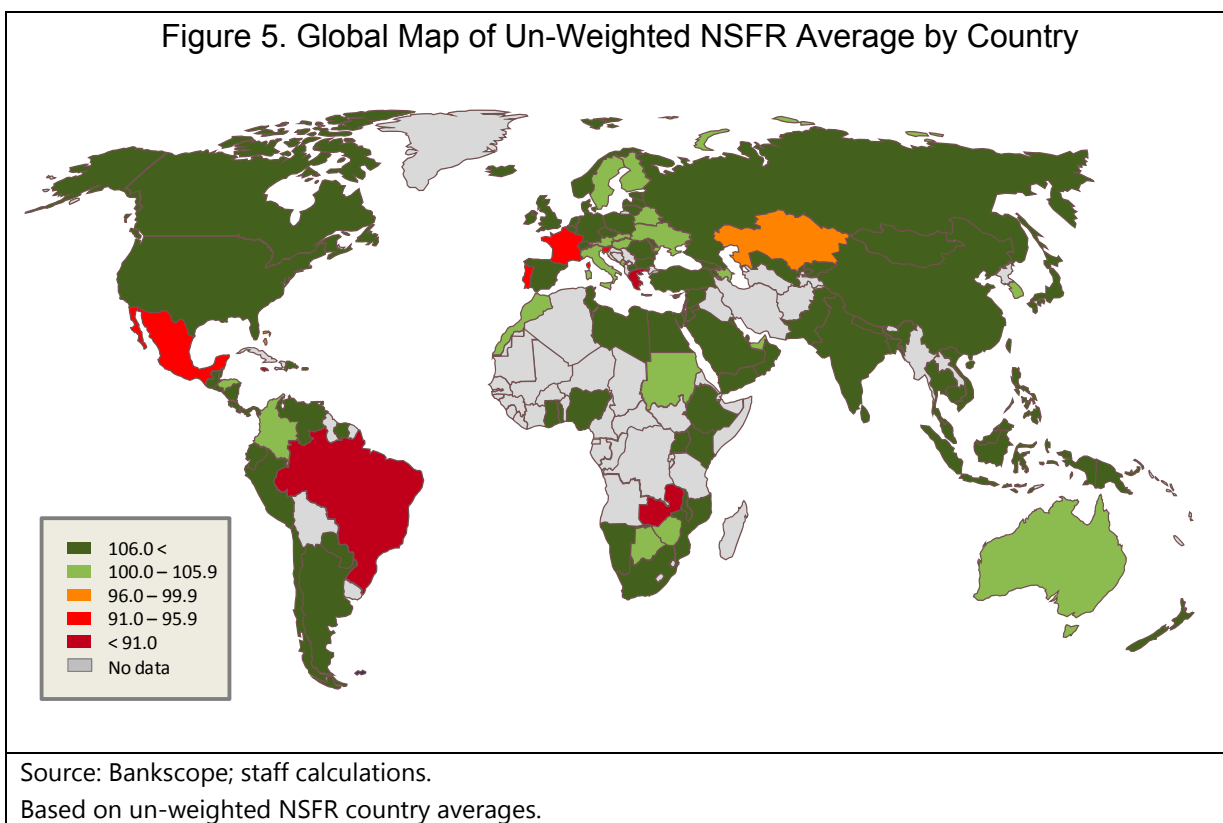
- Ten countries have a system wide un-weighted average NSFR of below 100 (Figure 5). Four countries are advanced economies (France, Greece, Portugal, and Slovenia) and the rest are emerging market or developing economies (Bahamas, Brazil, Jamaica, Kazakhstan, Mexico, and Zambia). There are significant regional differences: countries in Asia and the MENA and Central Asia region generally perform well, whereas European countries fare worse. For Latin America, the results are mixed.
- A relatively high number of banks meet the minimum NSFR threshold: 86 percent out of the total 2,079 banks had a calculated NSFR above 100 at end-2012.
- In some countries, the NSFR is much higher than 100 percent. This can be seen in the dispersion of the NSFR (Figure 6), and suggests that other factors are at play limiting banks' role in maturity transformation. Countries where the NSFR exhibit this behavior include Lebanon, Egypt, Indonesia and the Philippines, which have experienced periods of financial disintermediation and heightened country risk, with the latter two countries showing signs of stronger loan growth in more recent years.
- Where large systemically important domestic banks have a NSFR gap, the weighted average NSFR for the country tends to be lower than the simple average NSFR (Figure 7).<sup>28</sup> Generally, for most countries the weighted average is lower than the un-weighted average NSFR, except for a few, such as Mexico and Brazil. This suggests that the largest banks tend to have a lower NSFR (or even a shortfall) when compared to the mid-sized or smaller banks in the system. For countries home to large D-SIBs, and that rely more on short-term wholesale funding, such as Australia, France or Sweden, the dollar amount shortfall can be significant given that these banks account for a disproportionate size of the banking system and GDP. This could have a non-trivial impact on economic growth as the largest banks try to meet the minimum threshold by end-2017.
- Sensitivity tests show that the NSFR is sensitive to changes in the weights assigned to loans and deposits, and less to securities and off balance sheet balance (Figure 8). Changes in these weights can have a substantial impact on how many banks will meet or not meet the 100 percent NSFR threshold.

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<sup>27</sup> IFS and where not available central bank data were used to capture system wide lending.

<sup>28</sup> The NSFR gap is defined the amount by which required stable funding exceeds available stable funding at end-2012.

Figure 5. Global Map of Un-Weighted NSFR Average by Country



The calculations show that the NSFR calibration does a relatively good job in capturing excess maturity transformation risks. Existing measures, such as loan to deposit (LTD) ratio or core funding ratio, provide a fair picture of how the NSFR will be for a banking system. As expected, the NSFR is negatively related to the LTD ratio—banks with high LTD typically have low NSFRs.<sup>29</sup> Further, the NSFR along with the loan to core funding indicator improves relative to the LTD for most banks that complement their customer deposit funding with other sources of stable funding such as longer term market funding (Figure 9).<sup>30</sup> More specifically, for banks that have an active presence in capital markets and issue a range of capital market products and have a diversified funding portfolio, the core funding ratio or NSFR is a better measure for maturity mismatch than the LTD.<sup>31</sup>

The NSFR is also a broader prudential structural funding mismatch measure than the core funding ratio as it is more comprehensive in capturing funding risks on banks' asset and

<sup>29</sup> Although counterintuitive, Figure 9 does not suggest that there is a positive relationship between a bank's capital level and its NSFR.

<sup>30</sup> The core funding is defined as deposits plus banks' long term market borrowing of more than one year.

<sup>31</sup> For example, the LTD for one Swedish bank is high at 9.0, but then falls to just above 1.0 when accounting for the bank's large capital market operations. Its calculated NSFR at 102 percent suggest that it would have just met the prudential minimum threshold at end-2012.

liability side.<sup>32</sup> Sources of such risk captured by the NSFR include securities positions (HQLA versus non HQLA), fixed and other non-earning assets, and off balance sheet items such as guarantees and committed liquidity and credit facilities.<sup>33</sup> The NSFR requires that banks set aside minimum stable funding liabilities against these exposures. For most banks, the NSFR is negatively related to the core funding ratio on account of the more extensive liquidity risk capture. This can be seen in Figure 10 which compares the core funding ratio for the top 100 global banks by asset size at end-2012 with their NSFR: 26 percent of the top 100 global banks had a core funding ratio that exceeded 100 percent while 32 percent experienced a NSFR shortfall.<sup>34</sup> This share is also larger than the NSFR shortfall for the total sample of over 2000 banks covered in this exercise, where just 14 percent of the total sample experienced an NSFR below 100. This suggests that the larger global banks (the top 100 global banks by asset size) will more likely need to adjust their balance sheet and behavior to meet the NSFR.

To sum up, calculating the NSFR based on publically available financial statements shows that most banks in Asia and some advanced countries, such as the United States, appear to have sufficient funding buffers to meet the NSFR minimum threshold by early 2018 without requiring significant adjustments to their balance sheet. By contrast, the transitional costs will be higher for countries with larger gaps, in particular if their SIBs have a shortfall. This includes some advanced countries such as Australia, France Italy and Sweden as well as large EMDEs such as Brazil, Mexico, Ukraine and Russia. The results also show that the NSFR for G-SIBs has improved since the global financial crisis, with 75 percent of them reporting an NSFR above the minimum threshold at end-June 2013. The calculations further show that in most countries the largest banks on average are more likely to experience lower NSFRs than mid-sized or smaller local banks, albeit, not necessarily below 100. Similarly, the largest global banks by asset size are also more likely to experience a lower NSFR or an NSFR shortfall than mid-sized domestic banks. In countries where their largest D-SIBs have an NSFR shortfall, this can act as drag on banks' ability to lend and roll over loans. The overall impact on GDP is uncertain however as some of a bank's balance sheet adjustment can happen offshore, in the trading book or in non-core activities.<sup>35</sup> Alternatively, banks can also work around the one year NSFR rule by shortening the term of their loans to less than one year, as this takes on a lower RSF (50 percent for loans with residual maturity of 6-12

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<sup>32</sup> The core funding ratio is defined as loans divided against long term funding (deposits and market borrowing one year or more).

<sup>33</sup> Many off balance sheet exposures require little direct or immediate funding but can lead to significant liquidity drains over a longer time horizon (BCBS 2014).

<sup>34</sup> The BCBS ran a similar exercise in 2013 using data banks submitted for end-2012. The QIS included in total 232 banks (see Annex 1). In their case, 53 percent met or exceeded the 100 percent minimum NSFR requirement at end 2012.

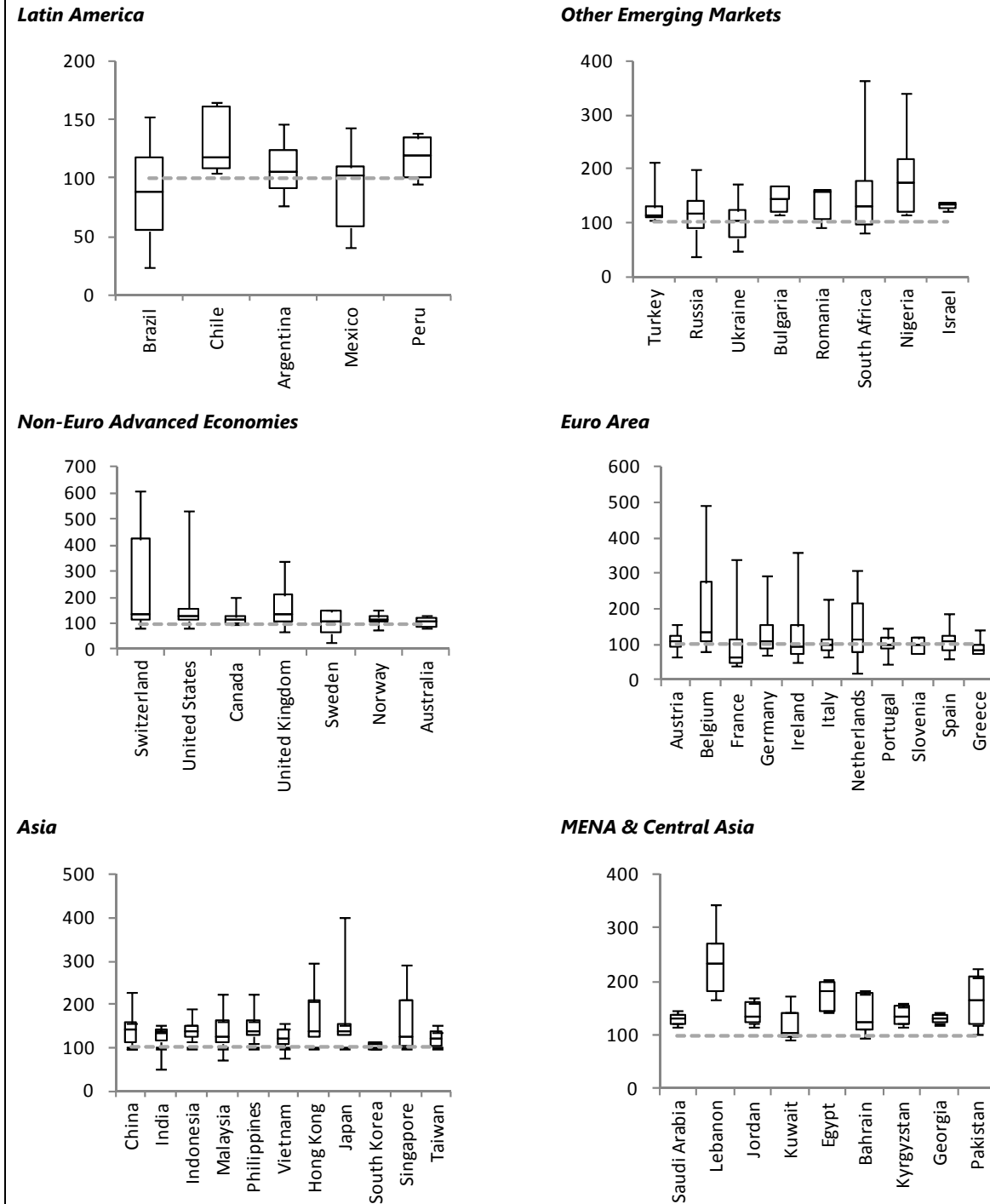
<sup>35</sup> The impact on a country depends also on whether banks have branches abroad. Some of the gap closure can be achieved through their branches, with potentially little direct impact on a home country's GDP. This is difficult to estimate given the little information on banks' branches at the consolidated level.

months), by increasing deposit mobilization and longer term funding, or by closing the gap through a combination of these actions. Studies have shown that banks' asset and liability structures change only slowly over time and that it will take time for banks to adjust their NSFR.<sup>36</sup> Finally, the calculations show that the NSFR as calibrated does a relatively good job identifying banks and banking systems exposed to excessive mismatch risk and "confirms our suspicion." It is a better prudential tool than LTD and core funding ratios, as it accounts for banks' capital market funding capacity as well as other sources of liquidity risk as aforementioned.

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<sup>36</sup> See IMF (2013).

Figure 6. Net Stable Funding Ratio Distributions



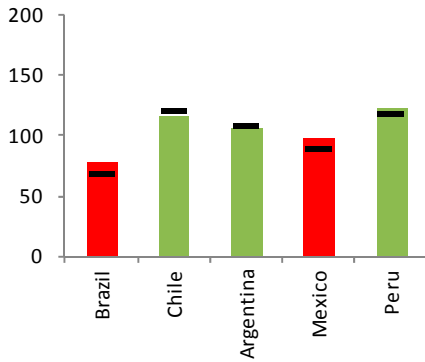
Source: BankScope; staff calculations.

The dashed grey bars indicate the 100 percent NSFR threshold. The boxes contain 75 percent of the observations for each country with the center line indicating the country median.

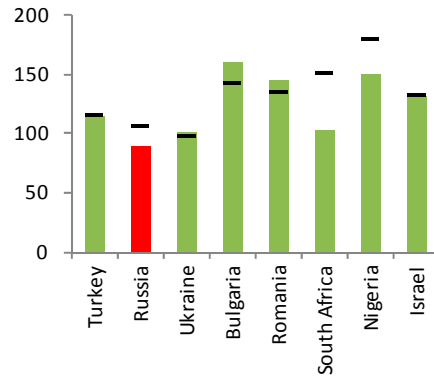


Figure 7. Asset-Weighted Net Stable Funding Ratio

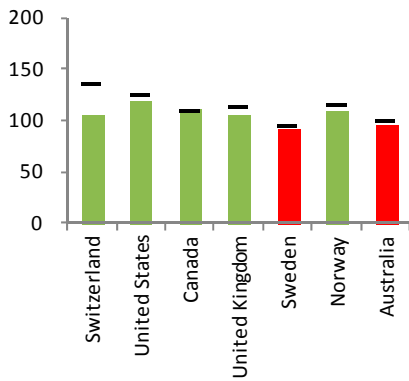
**Latin America**



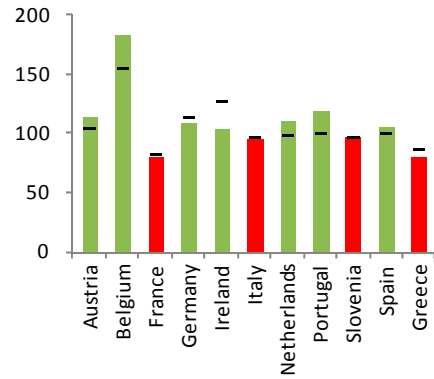
**Other Emerging Markets**



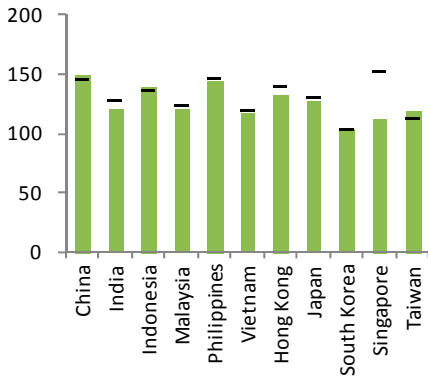
**Non-Euro Advanced Economies**



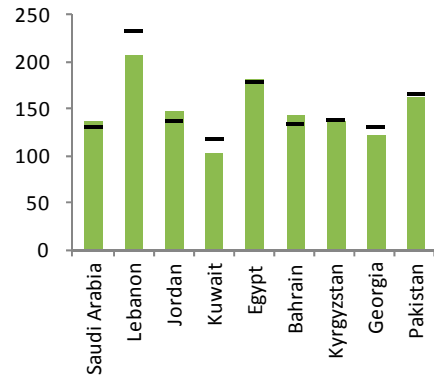
**Euro Area**



**Asia**



**MENA & Central Asia**



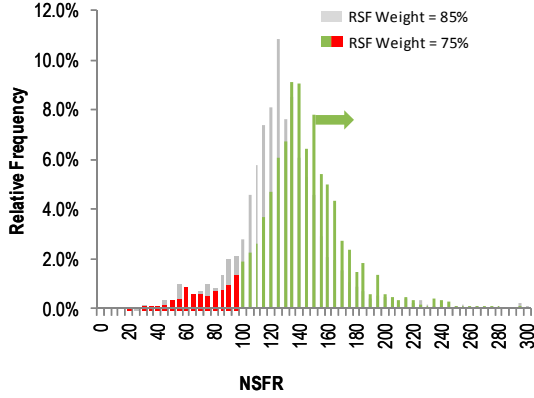
Source: BankScope; staff calculations.

The red bars indicate countries with asset-weighted NSF ratios < 100. The dashed lines represent the un-weighted country mean.

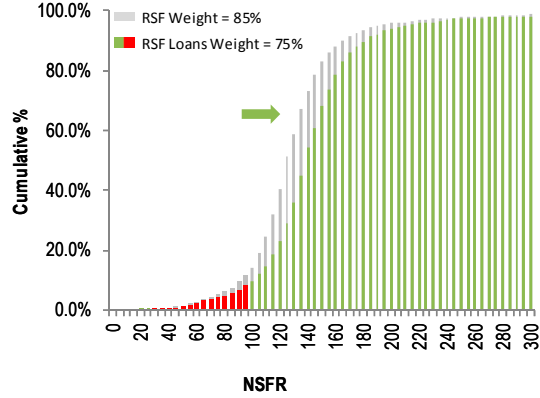
Figure 8. Sensitivity of NSFR to Changes in Key Weight Assumptions

**Change in RSF Weight for Loans**

*Histogram*

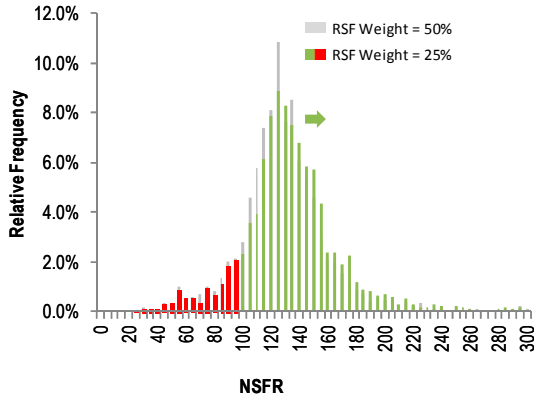


*Cumulative Distribution*

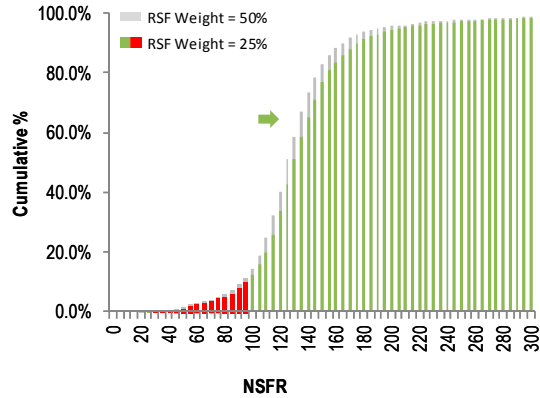


**Change in RSF Weight for Level 2 Securities**

*Histogram*

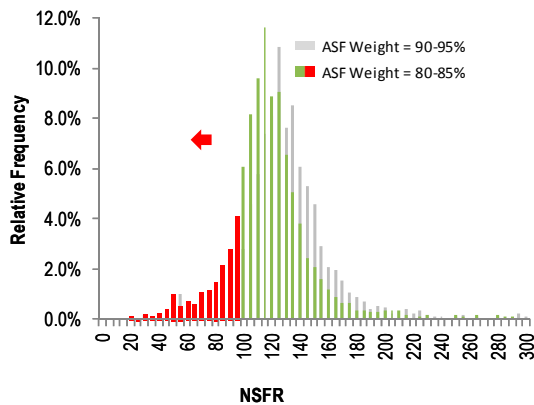


*Cumulative Distribution*

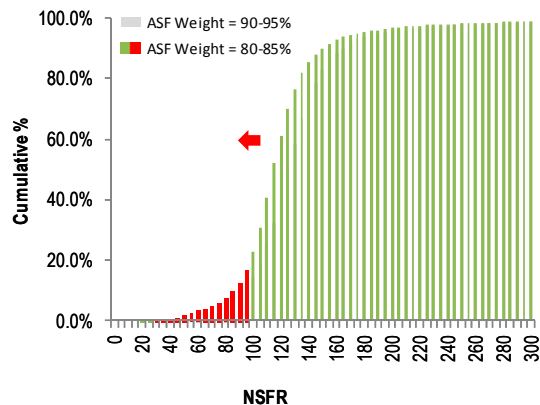


**Change in ASF Weight for Deposits**

*Histogram*



*Cumulative Distribution*

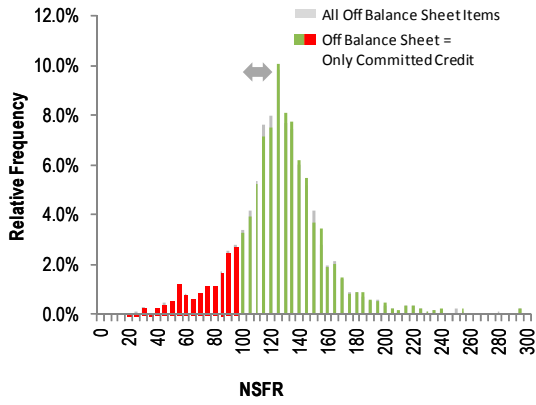


Source: BankScope; staff calculations.  
 Extreme values have been removed.

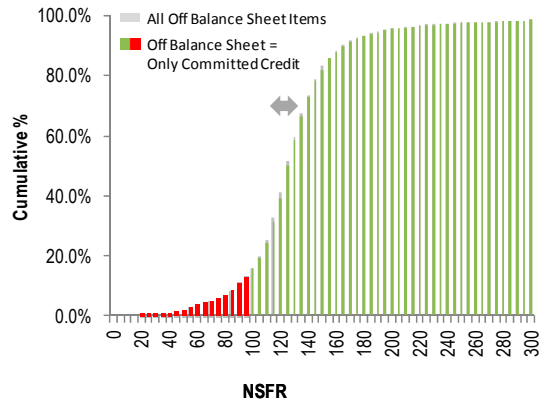
Figure 8. Sensitivity of NSFR to Changes in Key Weight Assumptions (cont.)

**Change in Items Included in Off-Balance Sheet Category**

*Histogram*



*Cumulative Distribution*

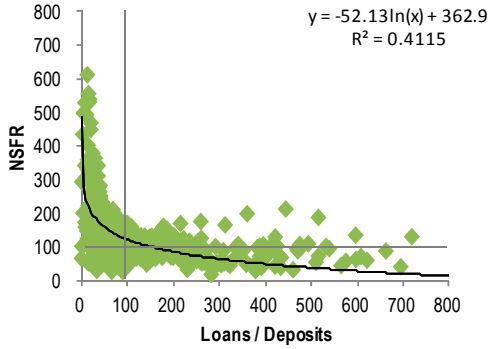


Source: BankScope; staff calculations.  
 Extreme values have been removed.

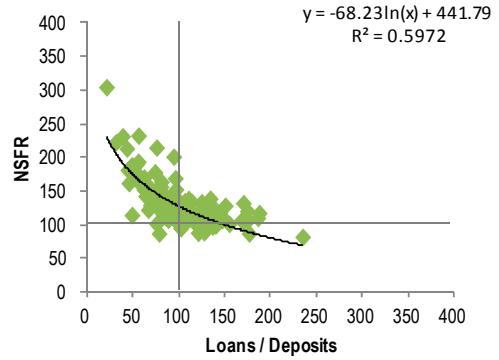
Figure 9. NSFR Scatterplots

**Net Stable Funding Ratio vs. Loans-to-Deposits**

Bank-level Observations

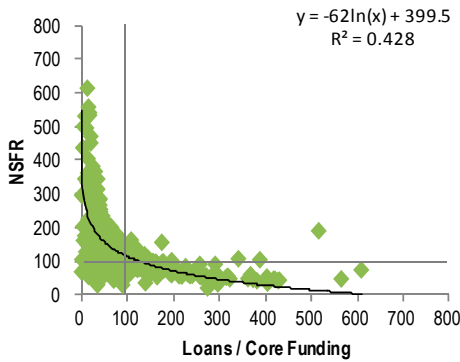


Country Averages

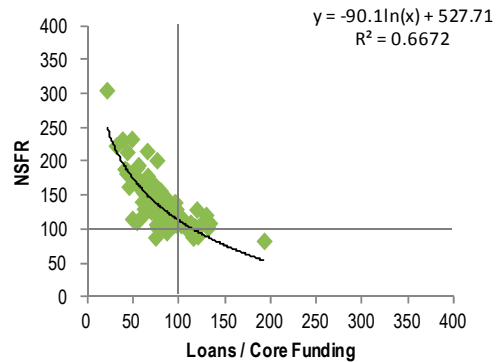


**Net Stable Funding Ratio vs. Loans-to-Core Funding**

Bank-level Observations

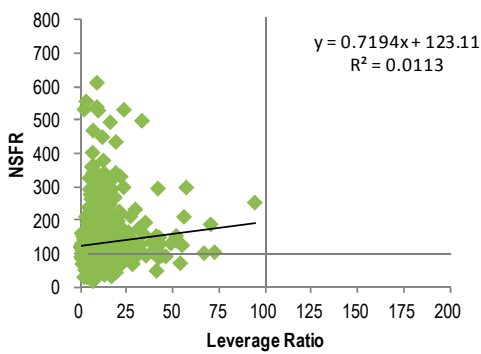


Country Averages

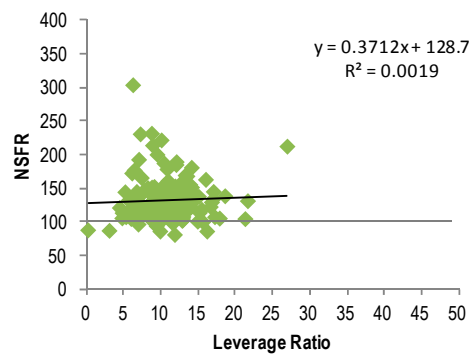


**Net Stable Funding Ratio vs. Leverage Ratio**

Bank-level Observations



Country Averages



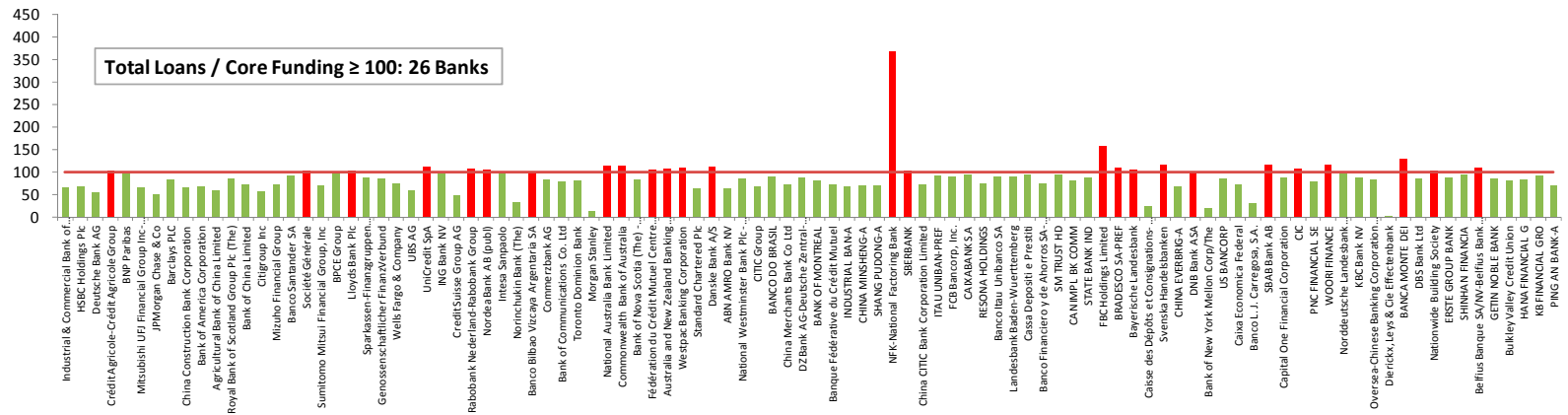
Source: BankScope; staff calculations.

Extreme values have been removed.

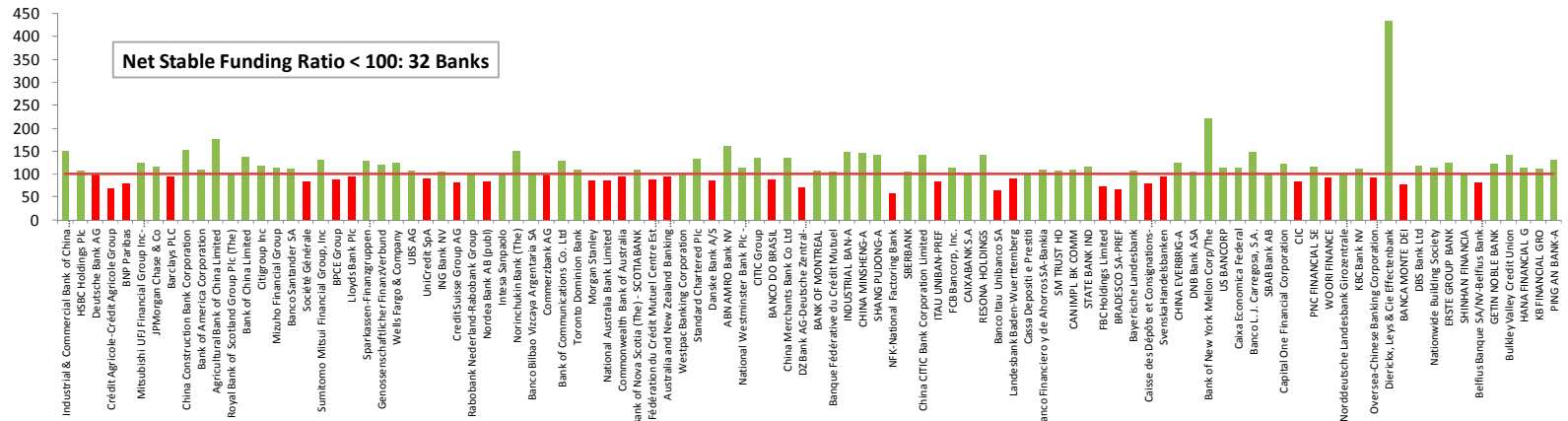
The core funding ratio is defined as loans divided against long term funding (deposits and market borrowing one year or more). The leverage ratio is defined as total equity divided against total reported assets.

Figure 10. Comparing the NSFR and the Core Funding Ratio

Loans to Total Core Funding for the Top 100 Banks by Assets



Net Stable Funding Ratio for the Top 100 Banks by Assets



Source: Bankscope; staff calculations.

The horizontal maroon bar indicates the 100 percent NSFR threshold.

The core funding ratio is defined as loans divided against long term funding (deposits and market borrowing one year or more).

## VI. IMPLEMENTING NSFR: POLICY RECOMMENDATIONS

Regulators face an array of challenges in introducing the NSFR at the country level, although the above analysis shows that the majority of banks are already meeting the standard. Banks have been provided with a proposed seven year phase in time to address asset and liability mismatches. Implementation of the NSFR as a minimum standard is expected to start in early 2018, following its announcement in 2010.<sup>37</sup> However, considerable regulatory effort still needs to go into properly distinguishing market from non-market funding, insured from uninsured deposits, secured from unsecured funding, and liquid from less liquid assets. Some of this classification and analytical legwork has already been done in the context of the LCR framework which many countries are already phasing in, and the framework can be applied to the NSFR. Banks will also have to invest considerable resources in upgrading their liquidity risk management systems and aligning them to the new LCR and NSFR reporting requirements. Importantly, policies to mitigate the impact of introducing the NSFR need to be developed particularly in countries where a large gap is expected. All these will need to be factored in the phase in implementation of the NSFR.

### A. Policy Considerations

As with other Basel regulatory requirements, the NSFR should be introduced as a globally-consistent regulatory requirement. It needs to retain comparability across jurisdictions and provide less room for cross border regulatory arbitrage. National discretion on ASF and RSF factors has to be constrained given that the calculations in the previous section show that the NSFR calibration along with the minimum threshold of 100 percent do not overly constrain banks and is a good regulatory measure to capture excessive maturity transformation risks by banks.

However, given that there may be cases where the NSFR has to be modified to avoid financial stability distortions, some flexibility at the national level needs to be allowed. For instance, if the NSFR is not properly calibrated, it could become an ineffective regulatory tool, as supervisors may find it difficult to intervene and tell banks to lower funding risks (even if their NSFR is above 100, i.e., the minimum). As the above calculation shows, changes in ASF and RSF factors for important asset and liability components make a substantial difference in the final NSFR figure, underlining the importance of having a proper calibration at the national level. One way of balancing the twin objectives (standardized versus flexibility) is to allow for some “guided discretion,” particularly by allowing countries to apply more stringent parameters. This would need to be supported by clear communication to foster the understanding in the markets on the specific benefits of the “adjusted NSFR.” In

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<sup>37</sup> By comparison, the regulators in South Korea announced the introduction of a 100 percent ceiling on LTD in 2009, and banks were given 2½ years to meet the ceiling (June 2012). The average LTD stood at 126 percent at the time of the announcement.

addition, any adjustments made, for example on ASF and RSF factors, relative to Basel III NSFR rules would need to be published. Several important issues that national regulators need to account for are discussed below.

### **B. Modified Calibrations of ASF and RSF factors**

Supervisors will need to take a cautious approach in designing the deposit weights for the NSFR, as deposit stability characteristics will most likely vary among jurisdictions, depending on market and institutional factors. Particularly deposits of retail and small business customers enjoy a favorable treatment under the NSFR framework. Similar to the LCR framework, deposits receive much higher ASF weights compared to other liabilities (except equity, Tier 2 capital, hybrid capital, and long-term debt all with ASF weight of 1). As the analysis in the previous section showed, slight changes in the ASF factors for deposits could make a number of banks pass the minimum NSFR. Box 2 lists some of the features that national supervisors need to take into account when determining the ASF factor for deposits.

#### **Box 2. Issues to Consider for Setting ASF Factors for Deposits**

- To qualify as highest ASF for deposits, insured deposits should be fully backed by a deposit insurance scheme that is prefunded via the periodic collection of levies on banks and otherwise have credible recourse funding means, such as guarantee from the government. The supervisor should make sure banks have an IT system that can continuously track the amount of deposits for insured and non-insured.
- Supervisors should be convinced that their banks have the capacity to distinguish operational deposits generated by clearing, custody and cash management activities from other kind of deposits (e.g., wholesale customers). Banks typically face significant IT and data challenges classifying deposits according to the type of customer and relationship. As a general principle, national supervisors need to be conservative if they are not convinced that banks have the capacity to make proper categorization (e.g. unless banks can identify which deposits qualify as “stable,” supervisors may require banks to place retail deposits into the “less stable” bucket).
- Supervisors need to be aware that deposits will not behave the same way across banks. The stickiness of deposits can reflect a host of factors. At the national level these include availability of a credible deposit insurance scheme, the existence of alternative forms of deposit-like instrument (e.g., money market investments), and the degree of competition from internet and mobile banking. At the banking business level, deposit stickiness may be a function of the depth of a bank’s customer relationship, including whether there are other transactional and operational relationships.
- Supervisors will need to take into account the impact of current regulatory reforms on deposit behavior. For instance, in the U.S. money market reforms and removal of regulation Q as part of the Dodd Frank Act could change the “stability” behavior of corporate treasury deposits. By contrast, the LCR and Basel III capital may make it more costly for banks to provide lending lines (e.g., liquidity and credit lines) and hence discourage the buildup of corporate deposit relationships. Corporate deposits are also treated less favorably in NSFR. Similarly, the introduction of the LCR and the NSFR could lead to greater competition for retail and SME deposits given their favorable treatment, and potentially reduce the stability feature of deposits.

Against this backdrop, regulators would need to examine whether the ASF factors stipulated in the Basel NSFR framework are justified in their jurisdictions. In some countries ASF could be substantially different from those assumed in the NSFR framework. Typical examples could be smaller jurisdictions where non-resident deposits play a big role or where large cross-border mobility of deposits is observed. These deposits could be less reliable, and a lower ASF factor could be applied; alternatively, limits could be set on the amount of deposits that could be included as part of ASF so no incentive is given to increase these deposits without affecting the treatment of the current deposit stock to avoid a negative impact on trade finance and project finance.

Regulators may also need to modify aspects of the NSFR to local circumstances to better account for the availability of capital markets and depth of market development. Some jurisdictions allow banks to issue covered bonds or securitize residential and corporate mortgages. This would change the liquidity value or characteristic of these assets and therefore also command a lower RSF weight. Regulators will need to take this into account, including enforcement of mortgage claims, in justifying different RSF for residential mortgages. Indeed the revision made by the BCBS changes the treatment of high quality residential mortgages and other high quality assets that are unencumbered and can be securitized, and those that qualify for a risk weight of 35 percent or less under the Basel II standardized approach for credit risk. Supervisors and banks can apply a RSF of 65 percent, when these necessary conditions are met. Similarly, the NSFR, consistent with the LCR, provides for a more favorable RSF treatment for securities that are held for trading or available-for-sale intention, compared to held-to-maturity designations, as these assets can be sold more easily by banks. On this, regulators in jurisdictions with less developed secondary markets may want to consider assigning these securities potentially a higher RSF treatment than currently called for by the NSFR framework.

### **C. NSFR Surcharge**

Another possible modification to the NSFR is to take into account broader macro prudential concerns. This can be done in different ways depending on the objectives and concerns. For one, a country-specific surcharge on the minimum NSFR threshold, as some countries do for capital standards, could be applied. The NSFR calculations show that in a number of countries most banks have a calculated NSFR much higher than 100 percent. While it is possible that the liquidity risk profile in these countries does not differ from others so that the minimum 100 percent remains valid, the high NSFR ratios in banks could also reflect differences in the actual stability of the liabilities and liquidity characteristics of assets in the country, thus differing from the ASF and RSF factors determined by the NSFR framework. For instance, factors that would push up the NSFR, such as high holdings of government securities relative to loans (and mostly in form of treasury bills) and a high share of deposits, could reflect a lack of confidence in the system, including potential balance of payment problems. In such cases, regulators may want to consider topping up the NSFR minimum. This can be done across banks in a country (like Pillar 1 buffers for the capital standard) or



bank-by-bank (like Pillar 2 measures). Alternatively, a surcharge on the NSFR could be added to account for the specific risk a bank or a group of banks contributes to system wide financial instability. This can be done in form of a Pillar 1 surcharge which would be similar to the Basel III capital surcharge that is applied to systemically important banks; or national regulators could also impose a surcharge on systemically important bank in the form of Pillar II requirement. Finally, a time varying surcharge in the form of Pillar 1 requirement could be imposed on banks to address the procyclicality of funding risk which would help dampen the credit cycle in the upturn and down turn.<sup>38</sup> Similar to the capital surcharge, it may be for prudential purposes not advisable to publish the bank by bank surcharge, although it would be important if the surcharge was applied to the system on the whole that the regulators be transparent about any changes made by publishing the measures taken.

#### **D. Further QIS and Monitoring**

National regulators should undertake further detailed quantitative QIS. QIS will provide valuable information in deciding on necessary adjustments to the NSFR framework and formulating policies to support the transition. The QIS should be done following adequate preparation, including enhancing banks' understanding of the framework. Regulators are further encouraged to use the methodology of calculating the NSFR as described in the previous section, as a first step so to get an initial overall picture. As the methodology only uses published balance sheet data, if complemented with supervisory data, the set of banks can easily be expanded and the overall bank by bank NSFR calculations should be more accurate.

It is desirable to include in the QIS an impact analysis on NSFR from the ongoing global and national financial regulatory reforms on banks' asset and liability structures and maturity transformation as well as on market liquidity. Many reforms have yet to be implemented. As the current calculations show that a number of banks and jurisdictions have a negative NSFR gap (equivalent to a shortfall in stable funding sources) at end-2012, regulators need to be mindful that banks could try to address this gap all in the same manner. This could lead to higher correlations across certain types of assets and liabilities, concentrations in some of them, with unclear financial stability implications. Similarly, the NSFR could encourage migration of some banking maturity transformation activities into other parts of the financial system, including capital markets. This should not necessarily be discouraged as it would allow for more risk diversification within a financial system and lower excessive maturity risk transformation undertaken by banks. Regulators should monitor this and have a good understanding of who is taking on the role; of who is providing the funding; and whether this is in form of leverage or capital. To the extent that some take on maturity transformation risk,

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<sup>38</sup> See ESRB (2014) for a discussion on how the NSFR can be re-designed to account for macro prudential concerns.

regulators could consider expanding the regulatory perimeter, as has been suggested by the FSB.

### **E. Policies to Mitigate Transitional Costs**

Countries have a number of policy options at disposal to mitigate the impact of implementing the NSFR. More broadly, the introduction of the NSFR should be part of a strategic policy package to address structural and regulatory gaps to help promote alternative sources of longer term funding, including capital market funding. This would enhance the stability of the financial system, by allowing for better matching of long-term investment and funding needs through capital market intermediaries such as pension funds, insurance companies and asset management funds.

Consideration should also be given to improving banks' access to other stable sources of funding. This could include improving financial inclusion to allow a greater share of the population access to banking services. This may help build banks' deposit base in some countries. Another option of a new stable funding source for banks is covered bonds. Covered bonds have been successful in many advanced economies in providing a stable source of funding even during the recent crisis. This may require legislative changes and developing supporting market services and infrastructures. However, these instruments also contain certain characteristics which policy makers need to consider, such as the possibility that they lead to a substantial part of a bank's asset becoming encumbered, making it costly for depositors (a deposit insurance scheme in case of insured deposits) and other unsecured creditors in case of resolution. To mitigate this, one policy option is to impose a limit on the total amount of encumbered assets or covered bond issued as a percentage of the bank's balance sheet. Examples where countries have adopted this approach include Belgium, Italy, and Australia (pledged assets are capped at 8 percent of domestic assets). Similarly, regulators need to address potential conflicts in some of the reform proposals. For instance, the availability of long-term funding could conflict with plans to make senior bondholders absorb bank losses under the bail in instruments. This will make it more costly for banks to raise long-term funding through bond issuance.<sup>39</sup>

Another source of long-term funding would be domestic and international capital markets, but this requires banks to have credit ratings, undertake road shows and improve financial reporting. More recently, regulators in Singapore have encouraged banks to issue long-term in international capital markets to address emerging liquidity mismatch risks in U.S dollars and other currencies. The Reserve Bank of India relaxed prudential limits on Indian banks' offshore bond issuance. While these developments need to be carefully monitored, such measures help diversify banks' funding source and investor base, and allow banks to tap into longer term funding.

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<sup>39</sup> IMF (2013).

More generally, banks should be encouraged to improve financial reporting on liquidity and other risks as well as strengthen accounting and auditing standards. This would help EMDE based banks tap into longer term funding sources. IMF FSAP findings have shown that for many EMDEs detailed reporting and disclosure remains an issue. The main shortcomings include: (i) the financial reporting is not yet compatible with international standards; (ii) there is no established auditing standards or requirements for the auditing profession; (iii) supervisors lack the power to remove or reject external auditors which are below standards; and (iv) supervisors lack the power to require sufficiently granular and timely information from banks. Addressing these issues should be ideally undertaken before implementation of Basel III NSFR in 2018. This would help improve banks' funding base, lower their funding costs over time and increase their franchise value.

Policymakers should further aim at developing broader and deeper capital markets to lower concentration of maturity transformation risk in banks. This should include policies to enhance corporate bond markets, improve market access to SMEs, and promote further equity and securitization markets. FSAPs have shown that further work is needed to broaden and deepen capital markets in EMDEs, including developing the local institutional investor base. While these reforms will take time, developing capital markets should help improve asset and liability structures of banks (via securitization and bond issuance) and allow non-bank corporations greater access to long term funding sources.

## VII. CONCLUSION

The results of the NSFR calculation using publically available data for a large number of countries and banks show there is no substantial gap in the NSFR globally, with EMDEs showing generally high NSFRs. But there is substantial variation among countries or banks in a country. The transition costs will be higher for countries with large D-SIBs that have an NSFR shortfall. The calculations further show that the NSFR for G-SIBS has improved since the global financial crisis mainly as a result of efforts to mobilize deposits, raise long term funding and capital.

The calculations also suggest that the NSFR parameters are broadly adequate and dispel some of the concerns that the NSFR may overly restrict banks' maturity transformation abilities. This likely reflects the fact that many banks have in place similar risk management frameworks for maturity transformation risk. As the calibration and weights for ASF and RSF categories do not appear too restrictive or too lax, banks' role in maturity transformation and financial intermediation at this juncture is not hampered by the introduction of the NSFR. However, given that the analysis used end-2012 and in some cases mid-2013 data, the NSFR could be potentially more binding in the future in cases where demand for long term credit outstrips a bank's available sources of stable funding. The NSFR further does a relative good job in producing consistent and robust measures of banks' funding risk across countries, compared to other standards currently in use.

There are many financial stability benefits that will be gained from introducing a structural maturity mismatch regulations in the context of the Basel accord framework. The NSFR would provide supervisors with an additional tool to help them identify banks that may have excessive exposure to maturity mismatch risks. Over time it should also incentivize banks to migrate to asset and liability structures that are more stable and less pro-cyclical. The NSFR would also push banks to upgrade their financial management system across their balance sheets and groups, helping improve more timely risk identification.

As with other Basel regulatory requirements, the NSFR should be introduced as a globally-consistent regulatory requirement. This will help it retain comparability across jurisdictions and provide less room for cross border regulatory arbitrage. National discretion on ASF and RSF factors should be constrained. That said, while the NSFR is a global regulatory standard, national regulators may need to have some discretion to modify the NSFR to local conditions, in particular to appropriately calibrate the stability features of deposits. Where there are such considerations, changes to the NSFR parameters would need to be clearly communication and published.

The effective implementation of the NSFR will require further capacity building in banks and supervisory agencies and require improving further liquidity risk reporting. On this, regulators should start with the data gathering process as soon as possible, as this will help identify information and capacity gaps as well as help improve their understanding of the impact of introducing the NSFR on their banking markets. The method of the calculation provided here in the paper will provide a useful tool for those authorities who are considering introducing the NSFR. It requires a limited set of balance sheet data that should be easily available to country authorities for their entire banking system and can be complemented with bank data from prudential returns. With this, country authorities can conduct their own impact analysis based on a broader set of banks and acquire a broad view on a bank-by-bank basis, prior to conducting full QIS with banks which takes time and resources.

Finally, regulators will also need to place more emphasis on strengthening the role of capital markets, including the role of market intermediaries such as insurance companies and pensions and others such as private equity funds, to allow them to take on a greater role in providing longer term funding and credit. This would help diversify the financial system and enhance financial stability by lowering any excess maturity transformation risk undertaken by banks.

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## Annex 1. Proposed NSFR Weights per Basel III Liquidity Framework

Available Stable Funding (Sources)		Required Stable Funding (Uses)	
Item	Availability Factor	Item	Required Factor
Regulatory Capital Other preferred shares and capital instruments not included in regulatory capital with residual maturity of one year or greater Other liabilities with an effective residual maturity of one year or greater	100%	Cash Central bank reserves Securities with exactly offsetting reverse repo Unencumbered loans to banks with residual maturity of < 6 months	0%
Stable deposits of retail and small business customers (non-maturity or residual maturity < 1yr)	95%	Unencumbered Level 1 assets, excluding cash and central bank reserves	5%
Less stable deposits of retail and small business customers (non-maturity or residual maturity < 1yr)	90%	Unencumbered level 2 assets	15%
Funding provided by non-financial corporate customers, sovereigns, central banks, multilateral and national development banks and public sector entities (PSEs) with non-maturity or residual maturity of less than one year Operational deposits Other funding with residual maturity between 6 months and less than one year, including by financial institutions	50%	Unencumbered level 2b assets HQLA encumbered for a period of 6 months or more and less than 12 months Loans to banks with residual maturity of 6 months or more and less than 12 months Operational deposits held with other institutions All other assets with residual maturity of less than 1 year, including loans to NBFIs, and non financial corporations, loans to retail and SME customers, and loans to sovereigns, central banks and PSEs	50%
All other liabilities and equity not included above, including liabilities without stated maturity Derivatives payable net of derivatives receivable, if payments are greater than receivables	0%	Unencumbered residential mortgages with residual maturity of one year and more or with risk weight of 35 percent Other unencumbered loans, excluding loans to financial institutions, with a remaining maturity of one year or greater that would qualify for the 35% or lower risk weight under Basel II standardised approach for credit risk	65%
		Other performing loans with risk weight greater than 35 percent under the standardized approach and residual maturities of one year or more Unencumbered performing securities that do not qualify as HQLA, including exchange traded equities and physical traded commodities, including gold	85%
		All assets encumbered for a period of one year and more NPLs, loans to FIs with maturity of 1 year or more, non exchange traded funds, fixed assets, pension assets, insurance assets, subsidiary interests, defaulted (non performing) securities, deferred assets, retained interest	100%
		Irrevocable and conditionally recoverable credit and liquidity facilities	5%
		Other contingent funding obligations, including recoverable facilities, trade finance related obligations such as letters of credit, guarantees, managed funds that are marketed with maintaining a stable value, and some structure products	National Supervisory Discretion

Source: BCBS.



## Annex 2. List of Banks Covered by Region and Country

Region	Country	Income Classification	Coverage	BCBS QIS Coverage as of Sept. 2013	Total Assets (USD in millions)	Gross Loans (% of System)
Africa	Botswana	Emerging	1	--	1,724.53	22.4%
	Ethiopia	Low Income	1	--	8,953.49	--
	Ghana	Low Income	8	--	5,031.06	34.4%
	Kenya	Low Income	13	--	16,558.88	61.1%
	Malawi	Low Income	5	--	856.13	54.8%
	Mauritius	Emerging	2	--	1,163.89	1.4%
	Mozambique	Low Income	1	--	2,292.18	26.6%
	Namibia	Emerging	1	--	2,491.57	27.6%
	Nigeria	Low Income	10	--	58,489.61	36.8%
	South Africa	Emerging	8	6	201,636.85	42.2%
	Sudan	Low Income	1	--	1,534.90	10.8%
	Togo	Low Income	1	--	19,950.30	510.7%
	Uganda	Low Income	1	--	372.81	6.0%
	Zambia	Low Income	2	--	220.14	4.3%
	Zimbabwe	Low Income	5	--	434,369.10	--
	Asia-Pacific	Australia	Advanced	19	5	3,066,397.58
Bangladesh		Low Income	18	--	38,725.75	44.2%
Brunei Darussalam		Emerging	2	--	7,698.73	22.7%
Cambodia		Low Income	2	--	2,712.10	20.6%
China		Emerging	41	6	14,995,943.50	65.2%
Hong Kong		Advanced	12	7	613,297.31	21.9%
India		Low Income	20	10	1,161,320.07	77.8%
Indonesia		Emerging	27	2	326,638.78	75.1%
Japan		Advanced	102	18	11,340,757.96	66.8%
Malaysia		Emerging	14	--	451,163.64	69.1%
Mongolia		Emerging	2	--	298.82	2.0%
Nepal		Low Income	3	--	1,339.58	8.2%
New Zealand		Advanced	2	--	13,785.69	4.4%
Papua New Guinea		Low Income	1	--	6,339.74	49.9%
Philippines		Emerging	17	--	123,198.62	63.3%
Singapore		Advanced	5	3	841,085.80	83.5%
South Korea		Advanced	14	8	1,856,275.78	62.5%
Sri Lanka	Emerging	11	--	7,938.58	18.0%	
Taiwan	Advanced	24	--	125,886.44	13.6%	
Thailand	Emerging	9	--	374,553.97	55.9%	
Vietnam	Low Income	14	--	149,342.72	59.4%	
Europe	Andorra	Advanced	4	--	19,253.73	--
	Austria	Advanced	16	--	629,123.72	44.6%
	Belarus	Emerging	3	--	137.82	0.5%
	Belgium	Advanced	15	3	1,258,683.35	49.9%
	Bulgaria	Emerging	5	--	96,473.78	--
	Cyprus	Advanced	5	--	144,285.03	76.7%
	Czech Republic	Advanced	4	--	18,088.22	6.5%
	Denmark	Advanced	36	--	780,438.48	50.1%
	Estonia	Advanced	2	--	775.67	2.2%
	Finland	Advanced	4	--	79,292.78	7.2%
	France	Advanced	64	10	11,274,004.38	86.6%
	Germany	Advanced	35	42	9,538,971.98	67.3%
	Greece	Advanced	11	--	511,700.64	76.6%
	Hungary	Emerging	9	--	9,565.47	6.3%
	Iceland	Advanced	3	--	15,930.34	67.1%
	Ireland	Advanced	9	--	559,815.14	27.8%
	Italy	Advanced	46	13	3,988,579.22	87.0%
	Latvia	Emerging	5	--	5,431.45	--
	Liechtenstein	Advanced	3	--	55,310.17	--
	Lithuania	Emerging	4	--	12,049.60	--
	Luxembourg	Advanced	7	1	233,672.24	10.5%
	Macedonia	Emerging	7	--	4,157.64	50.2%
	Malta	Advanced	4	--	12,891.67	10.3%
Moldova	Low Income	5	--	2,060.48	37.7%	
Montenegro	Emerging	1	--	673.84	19.1%	
Netherlands	Advanced	16	19	3,158,105.72	73.7%	
Norway	Advanced	33	--	513,355.13	73.2%	
Poland	Emerging	2	--	291,518.22	66.0%	
Portugal	Advanced	10	--	786,485.25	64.8%	
Romania	Emerging	3	--	12,422.81	10.5%	
Russia	Emerging	72	1	1,465,402.51	90.0%	
San Marino	Advanced	1	--	2,176.54	17.2%	
Slovakia	Advanced	1	--	7,625.54	29.7%	

## Annex 2. List of Banks Covered by Region and Country (cont.)

Region	Country	Income Classification	Coverage	BCBS QIS Coverage as of Sept. 2013	Total Assets (USD in millions)	Gross Loans (% of System)
	Slovenia	Advanced	7	–	37,629.90	59.6%
	Spain	Advanced	26	6	4,549,441.99	85.3%
	Sweden	Advanced	13	4	1,790,940.54	91.8%
	Switzerland	Advanced	44	7	3,146,903.23	52.9%
	Turkey	Emerging	17	6	501,539.94	67.9%
	Ukraine	Emerging	20	–	64,222.00	43.7%
	United Kingdom	Advanced	41	10	10,535,162.60	44.2%
<b>MENA and Central Asia</b>	Armenia	Emerging	2	–	771.35	10.5%
	Azerbaijan	Emerging	4	–	2,256.42	10.1%
	Bahrain	Emerging	8	–	52,793.30	51.9%
	Egypt	Emerging	7	–	136,199.45	51.8%
	Georgia	Emerging	4	–	4,432.91	40.0%
	Israel	Advanced	6	–	330,390.71	96.9%
	Jordan	Emerging	9	–	26,096.62	39.1%
	Kazakhstan	Emerging	16	–	629,162.79	80.4%
	Kuwait	Emerging	7	–	171,395.45	78.6%
	Kyrgyzstan	Low Income	3	–	1,645.73	–
	Lebanon	Emerging	11	–	338,733.99	90.3%
	Libya	Emerging	1	–	2,462.33	6.1%
	Morocco	Emerging	3	–	103,234.61	93.3%
	Oman	Emerging	1	–	20,581.79	38.5%
	Pakistan	Low Income	14	–	74,247.88	79.3%
	Qatar	Emerging	5	–	68,999.15	40.5%
	Saudi Arabia	Emerging	7	3	274,968.36	51.1%
	Syria	Emerging	1	–	810.77	–
	Tunisia	Emerging	7	–	27,890.49	58.8%
	United Arab Emirates	Emerging	16	–	377,110.52	81.2%
	Uzbekistan	Low Income	5	–	2,654.04	–
	Yemen	Low Income	2	–	2,770.34	12.6%
<b>Western Hemisphere</b>	Antigua and Barbuda	Emerging	1	–	339.48	13.6%
	Argentina	Emerging	15	3	75,148.30	56.9%
	Aruba	Advanced	1	–	944.19	34.1%
	Bahamas	Emerging	3	–	11,195.70	3.3%
	Belize	Emerging	1	–	690.60	36.9%
	Brazil	Emerging	35	2	2,805,462.47	71.3%
	Canada	Advanced	26	8	3,272,525.16	60.2%
	Cayman Islands	Advanced	5	–	7,520.71	–
	Chile	Emerging	14	–	201,334.38	69.5%
	Colombia	Emerging	5	–	147,378.54	56.4%
	Costa Rica	Emerging	8	–	11,703.17	33.8%
	Curacao	Advanced	4	–	5,895.73	–
	Dominica	Emerging	1	–	350.59	43.0%
	Dominican Republic	Emerging	4	–	16,347.49	73.5%
	Ecuador	Emerging	3	–	16,644.20	43.2%
	El Salvador	Emerging	3	–	5,807.94	40.0%
	Guatemala	Emerging	2	–	11,034.85	34.6%
	Honduras	Emerging	1	–	2,328.80	16.1%
	Jamaica	Emerging	1	–	4,325.81	26.0%
	Mexico	Emerging	19	7	120,058.02	23.3%
	Nicaragua	Emerging	1	–	481.28	10.1%
	Panama	Emerging	16	–	55,472.40	62.2%
	Paraguay	Emerging	1	–	513.15	3.1%
	Peru	Emerging	4	–	82,279.14	83.3%
	Saint Kitts and Nevis	Emerging	1	–	155.00	–
	Saint Lucia	Emerging	1	–	1,224.96	–
	Suriname	Emerging	2	–	1,519.61	38.6%
	Trinidad and Tobago	Emerging	2	–	5,526.16	22.8%
	United States	Advanced	726	13	14,080,600.03	65.0%
	Venezuela	Emerging	2	–	66,329.01	36.0%
<b>TOTAL</b>			<b>2,079</b>	<b>223</b>	<b>116,035,391.21</b>	<b>63.2%</b>

### Annex 3. Generalized Bridge of Data Series, Illustrative Balance Sheet Accounts, and NSFR Components

**Required Stable Funding Bridge**

<u>BankScope Asset Items</u>	<u>Generalized Asset Items</u>	<u>Generalized RSF Calculation</u>	<u>RSF Weight</u>
Gross Loans	Gross Loans	Gross Loans	
Net Loans	Net Loans	Net Loans	
Residential Mortgage Loans	Residential Mortgage Loans	Residential Mortgage Loans	0.85
Other Mortgage Loans	Other Mortgage Loans	Other Mortgage Loans	0.85
Other Consumer/ Retail Loans	Other Consumer/ Retail Loans	Other Consumer/ Retail Loans	0.85
Corporate & Commercial Loans	Corporate & Commercial Loans	Corporate & Commercial Loans	0.85
Other Loans	Other Loans	Other Loans	0.85
Memo: Mandatory Reserves included above	Memo: Mandatory Reserves included above	Memo: Mandatory Reserves included above	1.00
Loans and Advances to Banks	Loans and Advances to Banks	Loans and Advances to Banks	0.00
Total Securities	Total Securities	Total Securities	
Reverse Repos and Cash Collateral			
Plus: Trading Securities and at FV through Income			
Plus: Derivatives			
Plus: Available for Sale Securities			
Plus: Held to Maturity Securities			
Plus: Other Securities			
Memo: Government Securities included Above	Level 1	Level 1	0.05
Total Securities	Level 2	Level 2	0.50
Less: Memo: Government Securities included Above			
At-equity Investments in Associates	At-equity Investments in Associates	At-equity Investments in Associates	1.00
Other Earning Assets	Other Earning Assets	Other Earning Assets	1.00
Cash and Due From Banks	Cash and Due From Banks	Cash and Due From Banks	0.00
Total Assets	Non-interest earning assets	Non-interest earning assets	1.00
Less: Total Earning Assets			
Less: Total Earning Assets			
 <u>BankScope Off Balance Sheet Items</u>	 <u>Generalized Off Balance Sheet Items</u>		
Managed Securitized Assets Reported Off-Balance Sheet	Off balance sheet	Off balance sheet	0.05
Plus: Other off-balance sheet exposure to securitizations			
Plus: Guarantees			
Plus: Acceptances and documentary credits reported off-balance sheet			
Plus: Committed Credit Lines			
Plus: Other Contingent Liabilities			
 <b>Available Stable Funding Bridge</b>			
<u>BankScope Liability &amp; Equity Items</u>	<u>Generalized Liability &amp; Equity Items</u>	<u>Generalized ASF Calculation</u>	<u>ASF Weight</u>
Customer deposits	Customer deposits	Customer deposits	
Customer deposits - current	Customer deposits - current	Customer deposits - current	0.90
Customer deposits - savings	Customer deposits - savings	Customer deposits - savings	0.95
Customer deposits - term	Customer deposits - term	Customer deposits - term	0.95
Deposits from Banks	Deposits from Banks	Deposits from Banks	0.00
Other Deposits and Short-term Borrowings	Wholesale short-term borrowing	Wholesale short-term borrowing	
	1 month - 6 months	1 month - 6 months	0.00
	6 months - 12 months	6 months - 12 months	0.50
Total Long Term Funding	Long-term borrowing	Long-term borrowing	1.00
Derivative liabilities	Derivative liabilities	Derivative liabilities	0.00
Trading liabilities	Trading liabilities	Trading liabilities	0.00
Total Liabilities	Other liabilities (tax, pension, insurance)	Other liabilities (tax, pension, insurance)	0.00
Less: Funding Liabilities			
Equity	Equity	Equity	1.00