

## Summary

**T**he global financial crisis forced an overhaul of the global financial regulatory architecture. New standards, tools, and practices were developed, implementation was launched across the world, and the IMF was an important contributor to this effort.

With the benefit of hindsight, this chapter reviews the main failings in financial sector oversight before the crisis and assesses the progress in implementation of the reform agenda designed to address them. It also looks at whether shifts in market structure and risks in the global financial system since the crisis have been in the direction the new regulatory agenda intended—that is, toward greater safety.

The assessment shows that a decade after the global financial crisis, much progress has been made in reforming the global financial rulebook. The broad agenda set by the international community has given rise to new standards that have contributed to a more resilient financial system—one that is less leveraged, more liquid, and better supervised. Key successes include implementation of the Basel III capital and liquidity accords and widespread adoption of stress testing for the banking sector. The forms of shadow banking more closely related to the global financial crisis have been curtailed, and most countries now have macroprudential authorities and some tools with which to oversee and contain risks to the whole financial system. Furthermore, bank supervision has become more intensive, especially at large banks, and bank resolution regimes have been improved, with the expectation of government bailouts appearing to have diminished.

The chapter also looks forward, identifying areas in which consolidation or further progress is needed. Key priorities include completing implementation of the leverage ratio and of frameworks for the cross-border resolution of banks and for insurer solvency. Macroprudential authorities must also have an adequate toolkit with which to contain systemic risks. Existing progress in challenging areas such as bank compensation practices and use of credit rating agencies must be built upon, but new thinking may also be needed.

Financial sector reform efforts must continue to be coordinated internationally. An evaluation of the broader impact of the reforms is advisable 10 years after the global financial crisis, and any unintended consequences of the reforms should be assessed and addressed. The IMF supports a proportionate approach to regulation and supervision—whereby the complexity of technical standards and supervisory efforts and scrutiny are assigned in proportion to an institution's systemic importance and a jurisdiction's global importance. A rollback of reforms could spawn opportunities for regulatory arbitrage and lead to a race to the bottom in regulation and supervision. This could make the global financial system less safe and could jeopardize financial stability.

As the financial system continues to evolve and new threats to financial stability emerge, regulators and supervisors should remain attentive to risks. Oversight in new areas such as fintech and cybersecurity should be priorities, and continued vigilance on the perimeter of prudential regulation, in areas such as asset management, is appropriate. Finally, no regulatory framework can reduce the probability of a crisis to zero, so regulators need to remain humble. Recent developments documented in the chapter show that risks can migrate to new areas, and regulators and supervisors must remain vigilant to this evolution.

## Introduction

The global financial crisis provided the impetus for a major overhaul of financial regulation. No other financial crisis since the Great Depression had led to such widespread dislocation in financial markets and abrupt and persistent consequences for growth and unemployment, requiring a rapid, comprehensive, and internationally coordinated public sector response. Between 2007 and 2008, 24 countries experienced banking crises, with output today remaining below its precrisis trend in 85 percent of these countries (October 2018 *World Economic Outlook*). A candid acknowledgment that these costs resulted partly from weaknesses in the regulatory architecture and the failure of supervisors to curb the accumulation of vulnerabilities and excessive risk taking in the global financial sector was a key factor in the resulting overhaul of prudential rules and oversight.

The regulatory reform agenda agreed to by Group of Twenty (G20) leaders in 2009 elevated the discussions to the highest policy level and kept international attention focused on establishing a stronger set of globally consistent rules. With 10 years of hindsight, this chapter examines the progress toward regulatory reform, remaining gaps, and the emerging risks that may need to be tackled. The chapter starts by discussing what went wrong before the global financial crisis, identifying the key vulnerabilities behind it and how they accumulated. It then reviews the main reforms to the global regulatory and supervisory framework promoted by the international regulatory community to address these vulnerabilities, and provides a qualitative assessment of whether implementation of these measures has advanced as originally planned. The chapter also analyzes trends in selected indicators that shed light on the current resilience of the global financial system. The discussion focuses primarily on the advanced and large emerging market economies addressed by the Financial Stability Board (FSB) and the Basil Committee on

Banking Supervision (BCBS),<sup>1</sup> for which the agenda was designed, but it also considers the degree to which other advanced or emerging market economies may have adapted their regulatory and supervisory frameworks. The chapter also looks ahead to the remaining challenges in completing the implementation of the reform agenda, addressing its consequences, and facing new risks. Despite its breadth, the chapter does not analyze the potential macroeconomic consequences of the reforms, an undeniably relevant but acutely complex undertaking being advanced by the FSB (FSB 2017e).

## What Went Wrong before the Global Financial Crisis?

The immediate trigger for the global financial crisis was the correction in U.S. house prices starting in 2006, but a deeper analysis points to the structural vulnerabilities that accumulated globally during the preceding housing boom. These boom years were witness to the accumulation of financial vulnerabilities in banks and other financial intermediaries, which gathered in a regulatory and supervisory environment that, with hindsight, proved inadequate. Once housing values turned, these vulnerabilities amplified the large losses experienced by global financial institutions exposed to U.S. mortgage-related securities beginning in 2007, leading to knock-on effects that were felt across global financial markets and institutions through at least 2012. The rest of this section briefly describes the buildup of vulnerabilities that the regulatory reform agenda set up to address.

Leverage rose procyclically during the housing boom, and both the quality and quantity of capital were insufficient to absorb large losses. Several years of relatively benign macroeconomic conditions and low interest rates had supported a sustained U.S. housing boom, during which house prices and private sector leverage rose sharply (Figure 2.1, panel 1). Banks expanded lending without much increase in capital by transferring loans to off-balance-sheet special purpose vehicles (SPVs) that securitized them and sold them to investors. In Europe, the adoption of the euro led to a convergence of interest rates and lower borrowing costs for households, contributing to housing booms in Ice-

The authors of this chapter are Adolfo Barajas, James P. Walsh (team leaders), Alan Xiaochen Feng, Huyen Ngoc Phuong Nguyen, Mustafa Saiyid, Katharine Seal, Nico Valckx, and Juno Xinze Yao, with inputs from Evrim Bese Goksu and Florina Tanase of the Statistics Department; Marc Dobler, Constant Verkoren, and Froukelien Wendt; and divisions of the Monetary and Capital Markets Department, under the general guidance of Dong He, Fabio Natalucci, and Claudio Raddatz. Claudia Cohen and Breanne Rajkumar provided editorial assistance.

<sup>1</sup>The BCBS currently consists of 28 jurisdictions and 45 institutions.

land, Ireland, and Spain.<sup>2</sup> Capital resources appeared strong at many institutions, but the high leverage and the collapse of SPVs exposed banks to greater losses and many instruments used by banks to meet their regulatory capital—so called Tier 2 instruments—had poor capacity to absorb losses.<sup>3</sup> Frameworks for stress testing banks were rudimentary, and tail risks, such as a widespread decline in house prices, had been underestimated.<sup>4</sup> Banks entered the crisis with relatively low provisions for losses, putting additional strain on their capital buffers. Thus, bank capital turned out to be an insufficient and unreliable cushion when conditions deteriorated. Leverage in the nonbank financial sector also rose as securitization expanded market funding for loan assets held both on and off balance sheets, while reducing regulatory capital charges.<sup>5</sup> The business models of some insurance companies, in areas such as monoline insurance, changed in the run-up to the crisis, also calling for a new approach toward risk management and solvency.

Risks related to liquidity and funding arose in many economies.

- Bank funding shifted toward short-term and uninsured market-based sources. A shift from deposit-based banking to short-term wholesale market funding allowed banks to grow lending portfolios aggressively, but with increasing liquidity and maturity transformation.<sup>6</sup> This market funding—provided by other banks and money market funds, among other things—was not covered by deposit insurance and often involved interlinked chains of maturity transformation where assets used as collateral passed along multiple intermediaries,

<sup>2</sup>A similar process occurred in previous financial crises in advanced economies: Spain (1978), Norway (1987), Finland (1991), Sweden (1991), and Japan (1992). See Reinhart and Rogoff (2009).

<sup>3</sup>Some of these instruments required dividend payments even as the institution was failing.

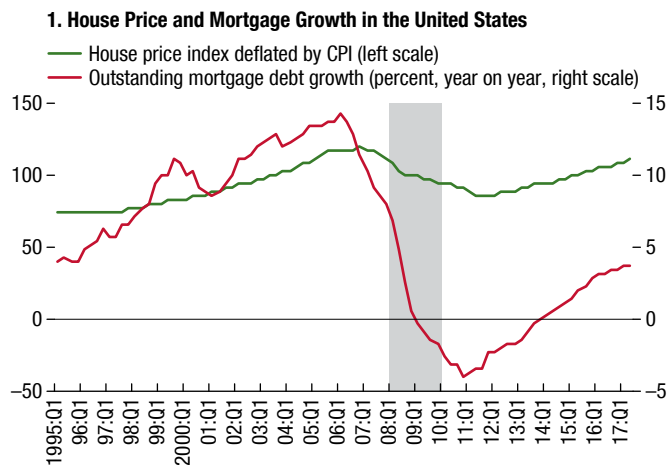
<sup>4</sup>The IMF routinely used forward-looking stress testing in FSAPs, and since 2007 the GFSR's tests modeled the risks associated with securitized products and their distribution throughout the global financial system. The importance of adequate stress testing is apparent in that the use of the Supervisory Capital Assessment Program in the United States to ascertain capital needs to be covered by the Troubled Asset Relief Program marked a turning point, reviving confidence in the banking sector.

<sup>5</sup>See Ashcraft and Schuermann (2008) and Adrian (2017). Leverage also increased for structured products as originators created collateralized debt obligations (CDOs) from mortgage-backed securities and CDO-squared securities from underlying CDO assets.

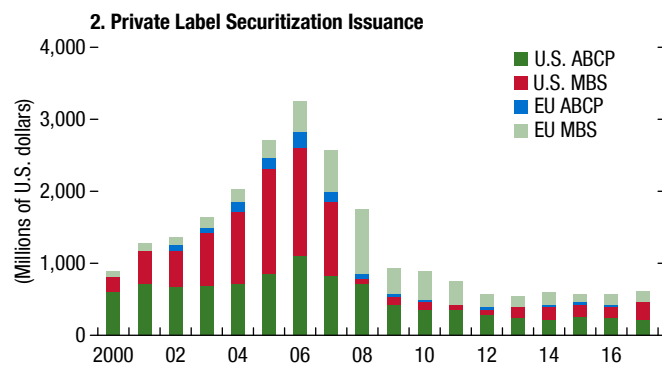
<sup>6</sup>Liquidity transformation refers to the funding of illiquid—hard to sell—assets using liquid liabilities. Maturity transformation arises from the funding of long-term assets with short-term liabilities.

**Figure 2.1. Developments in Housing, Credit, and Securitization**

Before the crisis, as house prices reached historical highs, mortgages and household debt surged ...



... as did securitization.



Sources: Association for Financial Markets in Europe; CRE Finance Council; Fitch Ratings; Haver Analytics; IMF, Research Department house price data set; JPMorgan Chase & Co.; Merrill Lynch; and IMF staff calculations. Note: The shaded area in panel 1 denotes the global financial crisis. CPI = consumer price index; EU ABCP = European Union asset-backed commercial paper; EU MBS = European Union mortgage-backed securities; U.S. ABCP = United States asset-backed commercial paper; U.S. MBS = United States mortgage-backed securities.

raising counterparty risk and increasing fragility. For example, the off-balance-sheet vehicles where banks transferred loans to reduce capital charges relied almost exclusively on short-term market funding such as that for asset-backed commercial paper (Figure 2.1, panel 2).

- The use of complex products as collateral raised liquidity risks.<sup>7</sup> The availability of market

<sup>7</sup>In the United Kingdom, Northern Rock, for instance, grew its lending at nearly 20 percent per year from 2000 to 2007 by

funding relied on the perceived quality of the mortgage-backed securities and other complex assets used as collateral. Falling house prices reduced the value of many of these products, and their complexity and opacity led to confusion about their underlying value, further impeding market clearing and choking off market funding. Banks and other financial intermediaries that relied on this funding, such as Northern Rock in the United Kingdom, faced liquidity pressures, and insurers that had sold default protection on structured securities, such as AIG in the United States, started facing massive losses and margin calls. As credit losses mounted, the solvency of banks and insurers was threatened.

- Exchange rate risk also grew. In France, Germany, and the United Kingdom, banks posted U.S. mortgage-related securities as collateral to obtain U.S. dollar funding. In Iceland, banks used cheap short-term pound deposits to fund high-interest-rate lending at home. And in Central Europe, low-cost euro- and Swiss franc-denominated mortgages grew rapidly. While banks maintained limited balance sheet exposure to currency risk, their hedging relied on the continuous availability of short-term funding in dollar and other currencies, and the currency mismatches of ultimate borrowers made banks' loan portfolios vulnerable to currency fluctuations.

Large and interconnected institutions were a key vulnerability. Regulating and supervising large investment and commercial banks, like Lehman Brothers, Bear Stearns, or Dexia, with increasingly complex operations spread across the world and multiple financial markets, became a challenge for both home- and host-country authorities. The sheer size, interconnectedness, and opaqueness of their operations meant that troubles in one of these institutions could create havoc in the home country and rapidly propagate through the global financial system. For these reasons, large complex financial institutions became seen as “too big to fail,” further strengthening moral hazard and incentives for risk taking. Beyond the banking sector, AIG, a large insurer, and other monoline insurers, played a key role in the market for asset-backed securities by selling default protection under assumptions that proved too optimistic. When short-term funding markets shut

---

issuing short-term market debt, using the mortgage loans it acquired as collateral.

down, central players began to run short on liquidity and some came close to failure.

Supervision of increasingly complex financial systems and resulting systemic risk was challenging. In wholesale funding markets, banks and other financial institutions provided funding to one another to meet short-term liquidity needs using both unsecured and collateralized debt, creating vast networks that spread across the regulatory perimeter, supervisors, and jurisdictions. Interconnectedness also rose through the common exposure that multiple types of financial institutions in the United States and Europe had to mortgage-related securitized products with increasingly complex rules for transferring cash flows and allocating losses, both directly and through over-the-counter (OTC) derivatives.<sup>8</sup> These mortgage-backed securities were highly rated by ratings agencies paid by the issuers and that faced conflicts of interest (including advising issuers on how to structure the securities to maximize their high-rating tranches). The participation of insurers in selling default protection on these securities further increased the linkages across financial markets and participants. These multiple interconnections between highly leveraged institutions with fragile funding structures increased systemic risk and ultimately played an important role in propagating the effects of the financial shock well beyond the mortgage and banking sectors. In most countries, no single “macroprudential” authority had a view of how risks migrated across sectors, or powers and tools to contain such systemic risks.<sup>9</sup>

Compensation practices, market discipline, and corporate governance were unable to tame market participants' incentives to take excessive risks. Compensation practices encouraged risk taking across banks, and at a time when returns were high, they greatly rewarded it. Market discipline and self-regulation were unable to provide an effective brake to excessive risk taking. The originate-to-distribute model where mortgage originators sold off loans to be securitized and

<sup>8</sup>The most common type of derivative contract was credit default swaps that offered protection from potential credit losses resulting from defaults in broad portfolios of these instruments.

<sup>9</sup>Systemic risk is defined as “the risk of widespread disruption to the provision of financial services that is caused by an impairment of all or parts of the financial system, which can cause serious negative consequences for the real economy” (IMF and others 2016). Macroprudential policy is defined as the use of primarily prudential tools to limit systemic risk (Crockett 2000; FSB, IMF, and BIS 2011; IMF 2013).

sold to third-party investors weakened incentives for sound credit underwriting. Investors accepted ratings assigned to these products without much scrutiny. The existence of implicit guarantees further eroded market discipline and distorted incentives toward risk taking as well: for example, with government-sponsored enterprises in the United States that were heavily involved in buying securitized bank loans, and with “too-important-to-fail” institutions. Governance at many large financial institutions was too poor to understand or control these risks (Chapter 3 of the October 2014 *Global Financial Stability Report* [GFSR]). Finally, a preference for relatively light supervision allowed this expansion of risk without adequate oversight or buffers.

The absence of viable resolution frameworks for large complex financial institutions compounded problems. There had been no identification of systemically important financial institutions, and thus no special mechanisms for their resolution. Later, as large banks became insolvent, it led to lack of clarity about the resolution strategy, adding to uncertainty.<sup>10</sup> While some systemic firms, such as Bear Stearns, were sold, the failure of Lehman Brothers initiated one of the worst stages of the crisis as fears of counterparty risk turned into panic. At this stage, policymakers were forced to take coordinated actions to inject capital into significant financial institutions and issue deposit guarantees in several countries.

### Assessing the Regulatory Agenda

With hindsight, the analysis of the developments described in the first section revealed that the prevailing regulatory framework was unable to contain the buildup of vulnerabilities and tame the incentives of market participants to take excessive risks. Shortly after the global financial crisis began, at the 2009 G20 summit, the international regulatory community convened to conduct a broad overhaul of the regulatory and supervisory framework.<sup>11</sup> Through a series of high-level

<sup>10</sup>Although the Federal Reserve was able to arrange a rescue package for Bear Stearns, no buyer was found for Lehman Brothers, and the firm subsequently failed.

<sup>11</sup>Ahead of the 2009 G20 Summit in Pittsburgh, U.S. President Barack Obama laid out the goals of this effort: “Essential to this effort [to promote recovery and to restore prosperity] is reforming what’s broken in the global financial system—a system that links economies and spreads both rewards and risks. For we know that abuses in financial markets anywhere can have an impact everywhere;

goals in multiple areas, the new architecture aimed to: (1) enhance capital buffers and reduce leverage and financial procyclicality, (2) contain funding mismatches and currency risk, (3) enhance the regulation and supervision of large and interconnected institutions, (4) improve the supervision of a complex financial system, (5) align governance and compensation practices of banks with prudent risk taking, and (6) overhaul resolution regimes of large financial institutions. Through its multilateral and bilateral surveillance of its membership, including the Financial Sector Assessment Program (FSAP), Article IV missions, and its GFSRs, the IMF has played a critical role in facilitating implementation of the regulatory reform agenda (see Box 2.1).

This section discusses the measures taken, implementation, and progress achieved in these areas. In addition, this section presents selected indicators of banking activity, resilience, and risks that shed light on the current health of the global financial system. Based on information on the largest banks in 80 countries—35 advanced economies and 45 emerging market economies—it analyzes trends and assesses whether the changes are statistically significant.<sup>12</sup> The aim is not to draw a strict line of causality between progress in regulatory reform and trends detected in the indicators, given that these are as much affected by the global macroeconomic backdrop and policy measures taken since the global financial crisis as they are by changes in supervision and regulation. Nonetheless, an assessment of these trends reveals areas in which relatively more or less change can be detected in the structure of banking and in progress toward building resilience.

### Enhancing Capital, Reducing Leverage and Financial Procyclicality

#### *Improving the Quality and Quantity of Capital Under Basel III*

The BCBS created a global framework for more resilient banks and banking systems: this meant more and better-quality capital. Focusing on common

---

and just as gaps in domestic regulation lead to a race to the bottom, so too do gaps in regulation around the world. Instead, we need a global race to the top, including stronger capital standards.” U.S. President Barack Obama, Federal Hall, New York, September 14, 2009, ahead of the 2009 G20 Leaders Summit in Pittsburgh.

<sup>12</sup>See Online Annex 2.1 at [www.imf.org/en/Publications/GFSR](http://www.imf.org/en/Publications/GFSR).

equity, Basel III increased the permanence and loss absorption of banks' capital (Figure 2.2, panel 1). In addition, it addressed the definition and composition of regulatory capital: it widened the risks being covered, balanced risk-based measures of capital with a new non-risk-based leverage ratio, and constrained the capital relief that banks could achieve by using their own models to calculate risk weights.<sup>13</sup> Basel III added capital cushions, such as the countercyclical capital buffer and capital conservation buffers, both of which can be drawn down at times of stress to mitigate procyclicality, and capital surcharges for systemic banks—a clear signal from the regulators that banks were not expected to skirt too close to the minimum regulatory standards. In addition, the BCBS completed its review of the regulatory treatment of sovereign exposures without changes to existing rules, as no consensus was reached.<sup>14</sup>

Implementation of the Basel III capital agreement has advanced largely as planned. Most jurisdictions implemented the agreement on time or shortly after the agreed-on timelines. As of March 2018, the BCBS had also assessed the timeliness and consistency of Basel III capital regulations for all its members under the Regulatory Consistency Assessment Programme (RCAP). Of the 19 assessments, 15 were compliant. Indonesia, Korea, and the United States were found largely compliant. The European Union (EU), grouping together nine Basel member jurisdictions, was found to be materially noncompliant.<sup>15</sup> All jurisdictions that were home to global systemically important banks (G-SIBs), including the EU, were found compliant with the G-SIB standards for imposing more intense supervision and surcharges for capital and leverage. Many non-BCBS countries have also implemented some parts of the Basel III capital agenda (Figure 2.2, panel 2).

Capital buffers have increased notably following the global financial crisis. Both regulatory capital ratios (Tier 1 and total capital ratios) have followed a steady upward trend since the crisis, and the global median common-equity-to-asset ratio (an inverse measure of

leverage) has increased by more than 2 percentage points since 2010 (Figure 2.2, panel 3). By 2017, all ratios were significantly higher than before the crisis (Figure 2.2, panel 4).<sup>16</sup> In part, the increase in regulatory capital ratios has been achieved because banks have moved away from assets with higher regulatory risk weights (Figure 2.2, panel 5).<sup>17</sup> Considering that the definition of regulatory capital was made more stringent after the crisis, the observed postcrisis increases in regulatory capital ratios are particularly encouraging.<sup>18</sup>

IMF FSAP surveillance has identified areas for improvement in the implementation of capital standards. FSAP analysis is complementary to and broader than Basel RCAP monitoring. The assessments have paid special attention to the willingness of jurisdictions to set banks' individual capital standards higher than the international minimum that Basel expects, and to the effectiveness of supervisory review of institutions, including the willingness to require capital remedies if needed.<sup>19</sup> While jurisdictions hosting the majority of banking assets are deemed compliant or largely compliant, materially noncompliant ones host a small but non-negligible fraction of banking assets (Figure 2.2, panel 6). Common reasons for non-

<sup>16</sup>The statistical significance of postcrisis buildups in capital buffers is markedly greater, for the full sample and for crisis countries, when the means tests are conducted on country-level data using the Financial Soundness Indicators database and the Global Financial Development database. See Online Annex 2.1 at [www.imf.org/en/Publications/GFSR](http://www.imf.org/en/Publications/GFSR) for details.

<sup>17</sup>Although the share of loans in total assets has not declined since the crisis, aggregate credit growth has declined in about three-quarters of countries analyzed. Based on a subsample of 47 countries for which there were sufficient annual observations, the average growth rate of real banking system credit to the private sector declined from the precrisis period (2000–07) to the postcrisis period (2010–15) in 27 countries. Real credit growth declined in 18 of the 27 BCBS countries.

<sup>18</sup>However, vulnerabilities remain. Chapter 1 shows how in some larger banks in advanced countries, leverage is markedly higher when calculated using market valuations, and capital simulations indicate that profitability shocks could leave a sizable portion of bank assets in capital deficiency. In addition, private indebtedness is currently high in some countries, and borrowers' ability to pay could come under further strain due to adverse movements in exchange rates or interest rates.

<sup>19</sup>Two key FSAP tools are stress testing and the sectoral standards assessments. The FSAP stress tests examine the resilience of a system to shocks, which sheds light on whether national implementation or deviations from regulatory capital standards set by the BCBS could introduce vulnerability. The Basel Core Principles assessment, which goes beyond regulations and evaluates supervisory practices, provides a richer understanding of a jurisdiction's approaches to bank capital adequacy.

<sup>13</sup>Floors to the risk reduction that can be achieved calibrated on the standard approaches were introduced (at 72.5 percent of the standard calculation).

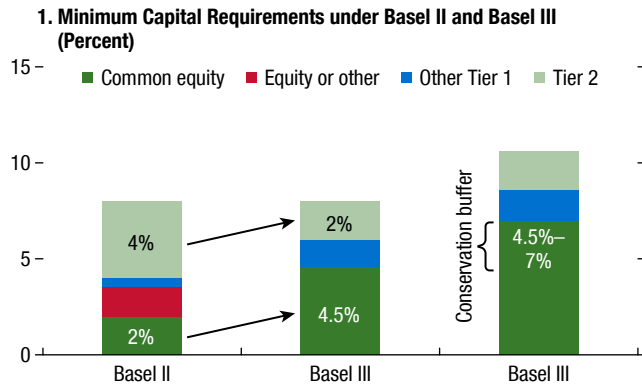
<sup>14</sup><https://www.bis.org/press/p171207a.htm>

<sup>15</sup>Divergences from the Basel standard in the EU included extended transitional treatment of small- and medium-sized enterprises and greater latitude given to banks using sophisticated approaches in calculating their capital requirements.

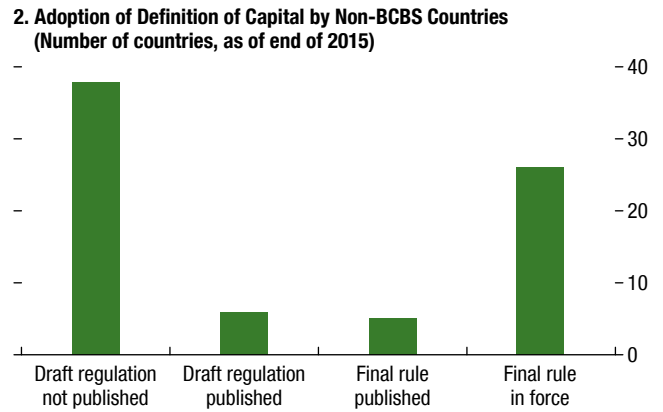


**Figure 2.2. Bank Capital Requirements and the Evolution of Buffers**

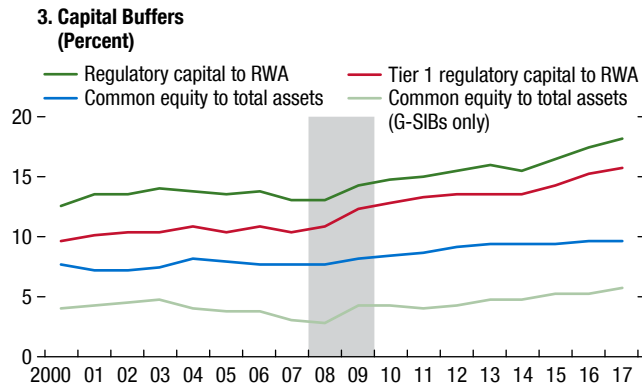
The Basel III standards called for higher and better-quality bank capital ...



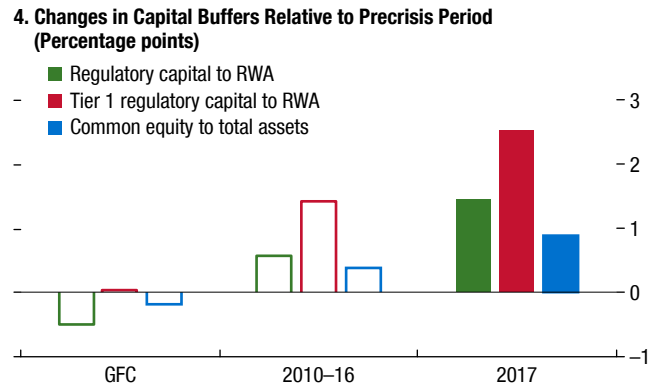
... and these standards were adopted well beyond the Basel Committee for Banking Supervision (BCBS) countries ...



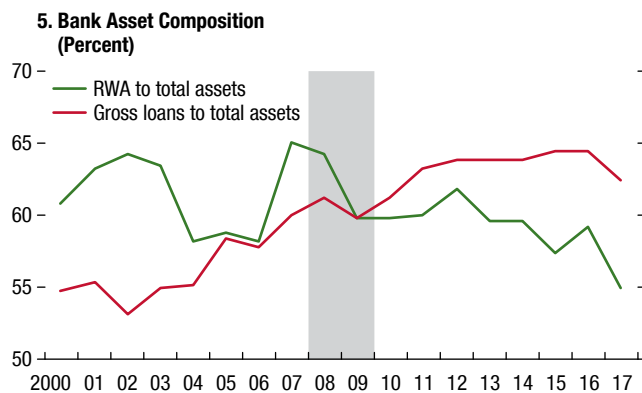
... thus contributing to a widespread postcrisis thickening of capital buffers ...



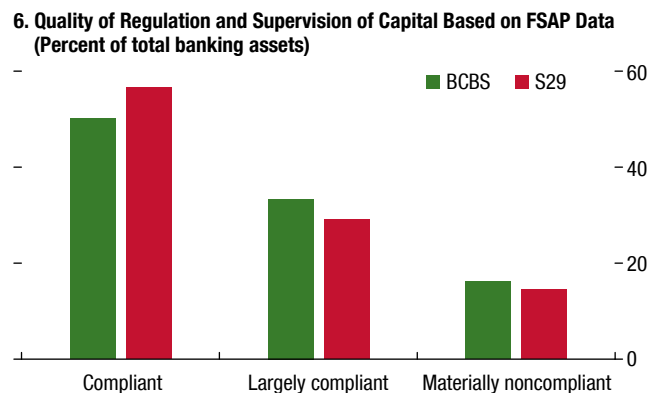
... leaving bank capital significantly larger today than before the crisis.



This was in part achieved through a de-risking of bank assets.



Today, the majority of banking assets reside in countries with good-quality capital regulation and supervision.



Sources: Basel Committee on Banking Supervision (2010); Fitch Connect; IMF, 2017 Macroprudential Policy Survey; IMF, Financial Sector Assessment Program; World Bank, Global Financial Development Database; and IMF staff calculations.

Note: Panels 3 and 5 correspond to the global median across medians at the country level for all countries in the sample. The shaded area denotes the global financial crisis (GFC). In panel 4, each bar represents the difference in means in the GFC, in the 2010–16 period, and in 2017 relative to the pre-GFC period (2000–07). Solid bars indicate that the differences are statistically significant at the 10 percent level. In panel 6, the S29 is the group of 29 countries included in the Financial Stability Board Shadow Banking Monitor. Not all S29 and BCBS countries have been graded since the crisis. Panel 6 is based on the results of past and ongoing IMF FSAPs. BCBS = Basel Committee for Banking Supervision; FSAP = Financial Sector Assessment Program; G-SIBs = global systemically important banks; RWA = risk-weighted assets.

compliance are: political pressures against enforcing regulatory agreements, structural features of economies (such as the widespread presence of small- and medium-sized enterprises in the EU), and the fact that adequate powers and readiness to use them can take time to be internalized.<sup>20</sup>

### *Reducing the Procyclicality of Leverage*

The main countercyclical capital tool is the countercyclical capital buffer (CCyB). This buffer should be activated to lean against the accumulation of systemic risks during periods of financial exuberance, and be released when the cycle turns.<sup>21</sup> At the end of 2017, some BCBS jurisdictions had not set the CCyB above zero, despite relatively large credit gaps, a measure of the difference between the current ratio of credit to GDP and its long-term trend (Figure 2.3, panel 1).<sup>22</sup> Outside the BCBS, the use of CCyB has been sparing. Reasons vary: some country authorities feel that risks can be sufficiently contained with other tools, either microprudential or macroprudential, or that taking into account other indicators of credit risk would weigh against its use. Others are concerned that activating the CCyB will lead to disintermediation as bank costs rise above those of less regulated sectors.

Shifts in accounting rules are also aimed at reducing procyclicality. Forward-looking provisioning is one tool that has been particularly effective. Some countries, such as Brazil and Mexico, already prescribe that loan loss provisions be recognized based on expected losses, and the two main international standards—settings boards for accounting have developed new standards that will require forward-looking estimates of “current expected credit losses.”<sup>23</sup> Forward-looking provision-

ing should reduce the amount of lending at the top of the credit cycle because expected losses would rise, leading banks to curtail lending to conserve capital for provisioning.

Other tools have been used, as well. The capital conservation buffer and leverage ratio also contained in Basel III regulations should be more binding and limit balance sheet expansion in the upswing of the cycle. Regulation also allows the capital conservation buffer to be used in times of stress. The capital conservation buffer has been introduced very broadly, but progress in the leverage ratio has been more gradual. Countries have also used tools such as caps on credit growth, although such caps have been used primarily in emerging markets.<sup>24</sup>

There are indications that procyclicality of bank credit has also declined. A simple measure—the regression coefficient of real quarterly bank credit growth on real GDP growth, both detrended—indicated significant procyclicality in a sample of 61 countries in the precrisis period. Then its value declined and it became nonsignificant in the postcrisis period. When estimated at the country level, this measure shows declines in procyclicality of credit in 60 percent of the sample countries, and in slightly more than half of BCBS countries (Figure 2.3, panel 2).<sup>25</sup>

More-targeted tools have been used most often in relation to household credit risks in real estate. Although sectoral tools have been used for corporate sector risks, tools aimed at containing the cyclical risks related to real estate prices are much more common (Figure 2.3, panel 3). Some countries assign higher risk weights to housing loans with higher loan-to-value ratios. This approach will be applied more widely as the revision to the standardized approach for credit risk—one of the last aspects of Basel III—is adopted. Many countries have introduced loan-to-value caps, sometimes differentiated by the size of the loan, whether the house is a first or second home, or tenor of the loan. Debt-service-to-income ratios—which require a great deal of information about borrowers and which

<sup>20</sup>Successive FSAPs in Germany (2011 and 2016) and Japan (2012 and 2017) found that the supervisory authorities did not impose higher than minimum capital requirements, even when the powers to do so had been provided.

<sup>21</sup>The countercyclical capital buffer in most countries is designed to be raised with a delay, to allow banks time to build up capital, but can be released immediately.

<sup>22</sup>Many European countries—the Czech Republic, Iceland, Norway, Slovakia, Sweden, and the United Kingdom—have set the CCyB at levels between 0.5 and 2 percent. In addition, Hong Kong SAR has currently set its CCyB at 1.875.

<sup>23</sup>These standards-setting bodies are the International Accounting Standards Board (IASB) globally and the Financial Accounting Standards Board (FASB) in the United States. The International Financial Reporting Standard (IFRS 9) for financial instruments, set by the IASB, was required beginning in January 2018. The FASB does not require this for listed companies until 2020. For a discussion, see Cohen and Edwards (2017).

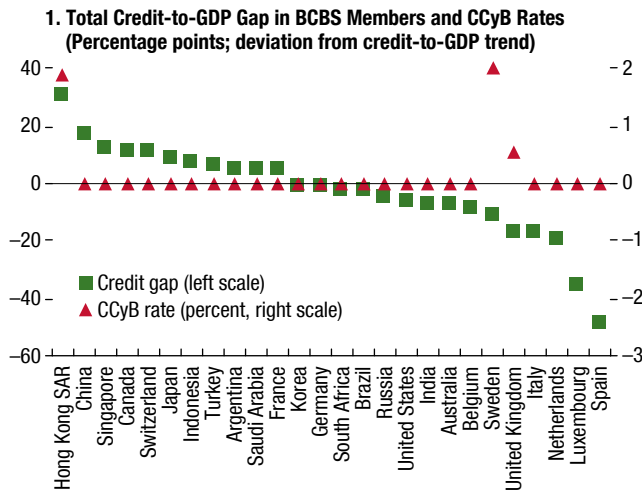
<sup>24</sup>For example, China’s Macroprudential Assessment tool looks at the pace of lending, with measures determined accordingly.

<sup>25</sup>Furthermore, bank-level analysis suggests that leverage has gone from being slightly procyclical in the precrisis period to slightly countercyclical in the postcrisis period. This analysis was conducted on a subsample of banks for which a sufficiently long time series was available. This subsample contained only banks in Canada and the United States.

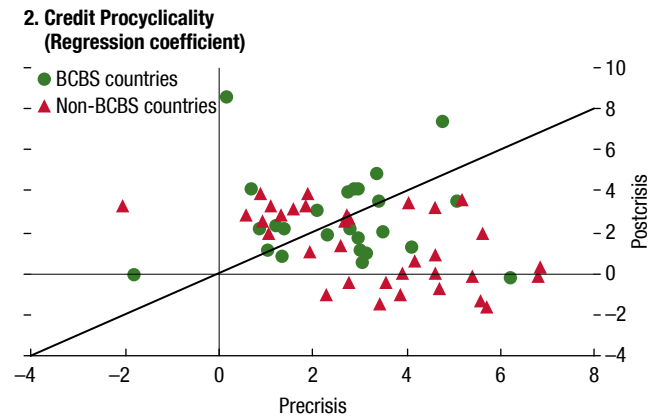


**Figure 2.3. Procyclicality: Regulatory Tools, Outcomes, and IMF Technical Assistance**

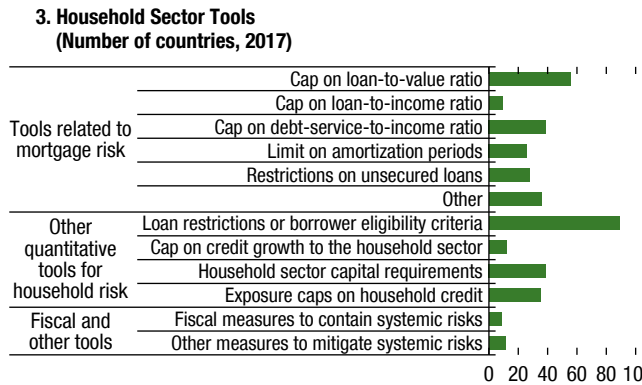
Despite positive credit gaps in many countries, countercyclical capital buffers have been triggered infrequently.



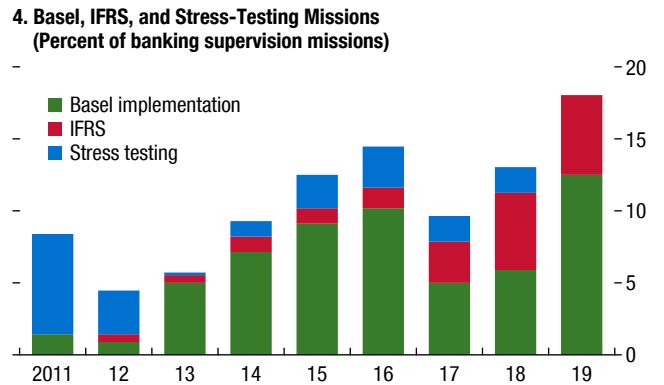
Most countries have seen declining procyclicality of their bank credit since the crisis ...



... as a variety of sectoral countercyclical tools have taken hold.



A fundamental IMF role in the reform agenda has been through its technical assistance activities.



Sources: Bank for International Settlements; Fitch Connect; IMF, 2017 Macprudential Policy Survey; IMF, Financial Sector Assessment Program; and IMF staff calculations.  
 Note: In panel 1, credit-to-GDP gap is calculated as of 2017:Q3. In panel 2, each point represents the country-level regression coefficient of real quarterly banking system credit growth on quarterly real GDP growth, both detrended. The horizontal axis shows the coefficient estimated for the precrisis period (2000–07), and the vertical axis shows the coefficient for the postcrisis period (2010–15). BCBS = Basel Committee for Banking Supervision; CCyB = countercyclical capital buffer; IFRS = International Financial Reporting Standards.

can become less binding just as low interest rates encourage leveraging—are used in several countries, particularly in Europe and Asia. Despite their greater resilience to interest rate shifts, debt-to-income ratios have been used more sparingly.

**Stress Testing Capital Buffers**

Stress testing has become a central component of bank supervision. Microprudential stress testing, used to assess the impact of stress scenarios on the solvency (and liquidity) of banks, had been developed before

the crisis. Following the U.S. Supervisory Capital Assessment Program in 2009, however, use of the tool spread widely. While existing frameworks can still be improved (for example, resilience is often tested to only a single scenario and estimated bank losses are generally less than historical experience), stress testing is now used by almost all supervisors of sophisticated banking systems to assess capital adequacy under potential stress scenarios, and supervisory practices in some jurisdictions (such as the United Kingdom and the euro area) have been reorganized around

stress tests. FSAPs, along with technical assistance to countries to improve their stress-testing frameworks, have helped spread expertise developed in advanced economies with supervisors across the full range of the membership (Figure 2.3, panel 4).

### *Leverage in the Nonbank Sector*

Greater focus on risk in solvency frameworks and constraints to leverage and procyclicality has also been added in the nonbank sector. Solvency frameworks and regulation for insurance companies have been improved in some countries and regions (most notably, implementation of Solvency II in the EU), but a globally consistent approach is still under development. Separately, many of the riskier businesses in which insurance companies became involved have now been wound down in light of the greater focus on systemic risk in the insurance sector since the global financial crisis. Securities financing has also been constrained by the FSB's 2014 framework for haircuts on non–centrally cleared securities-financing transactions, and final or draft rules have been issued in many jurisdictions (BCBS 2017). Consolidated supervision has also helped reduce the leverage of some nonbank financial institutions, but it has not been fully implemented in many jurisdictions, thereby facilitating regulatory arbitrage within financial groups. Nonetheless, measurement of leverage in asset managers is difficult and information is limited, with some evidence pointing to its increase (see Chapter 1 of the April 2018 GFSR).

## **Containing Funding Mismatches and Addressing Liquidity and Currency Risk**

### *The Basel III Framework for Bank Liquidity*

Two new regulatory liquidity ratios for banks emerged from the crisis. The first to be implemented, beginning in 2015, was the liquidity coverage ratio (LCR), based on the concept of holding a stock of liquid assets to withstand a high degree of stress for a 30-day period. The other, the net stable funding ratio (NSFR), implemented beginning in 2018, is based on managing the potential mismatch between asset and liability maturities up to a one-year horizon. All Basel member countries have already implemented the LCR and undergone Regulatory Consistency Assessment Program assessments, which indicate that they have achieved consistency with the agreed-on Basel frame-

work (Figure 2.4, panel 1). In contrast, implementation of the NSFR has proved to be more demanding because of the discretion needed to ensure its effectiveness in local markets.<sup>26</sup> Thus, while the NSFR should have been implemented by January 2018, some jurisdictions have not issued draft proposals and others have drafts with open deadlines for conclusion (Figure 2.4, panel 2). Outside BCBS membership, there has also been interest in adopting the Basel III liquidity standards (Figure 2.4, panel 3).

FSAP assessments show that wholesale funding is still important in various jurisdictions and that a broad review of liquidity risks will always be necessary. A clear objective of the liquidity reforms was to reduce reliance on volatile short-term funding. However, FSAP observations between 2012 and 2018 indicate that banking systems in major jurisdictions still rely significantly on wholesale funding. Although some jurisdictions have introduced liquidity stress testing using horizons beyond the 30-day LCR horizon and highly granular supervisory data, the FSAP risk analysis findings also identified instances in which stress-testing techniques for assessing the scale and nature of liquidity risks warranted further development.<sup>27</sup> Without adequate stress-testing tools and insights, liquidity metrics might be misleading. In addition, the FSAP has also identified instances in which the banking community, shielded by benign market conditions, has been slow to develop risk management skills (Figure 2.4, panel 4).

Nonetheless, liquidity buffers have, on average, grown since the global financial crisis, and reliance on wholesale funding is trending downward. In particular, banks' holdings of cash and government securities, considered to be highly liquid, have increased as a share of total assets, and recent reporting of the LCR shows levels well above 100 percent and increasing since data became available in 2014 (Figure 2.5, panel 1). Holdings of government securities have risen in many countries (Figure 2.5, panel 2), which could also signal persistence

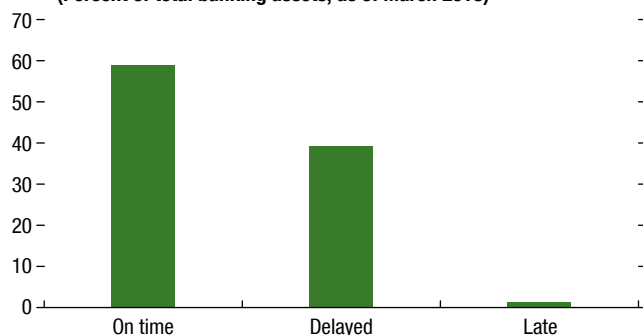
<sup>26</sup>The fine-tuning of this tool is challenging because supervisors need to impose standards that adequately reflect funding risk profiles without unduly constraining banks' business and inducing banks to favor short-term lending at the expense of projects that require funding for more than one year. The NSFR from the outset was recognized as requiring more time for implementation. Even so, delays are likely.

<sup>27</sup>Reliance on wholesale funding was highlighted in the FSAP for France in 2012, Korea in 2014, and the Netherlands and Japan in 2017. Improvements in liquidity stress testing were suggested for Canada (2014), Germany (2016), China (2017), and Japan (2017).

**Figure 2.4. Overview of Postcrisis Regulatory Progress in Liquidity**

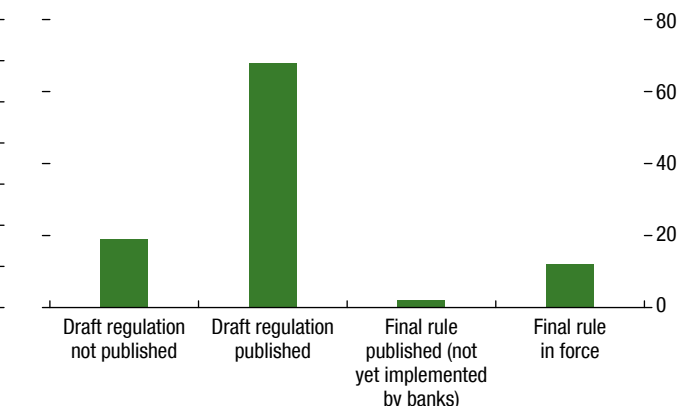
Most countries are on track to implement core liquidity standards ...

**1. Timeliness of Implementation by BCBS Countries of the Core Liquidity Requirements of Basel III (Percent of total banking assets, as of March 2018)**



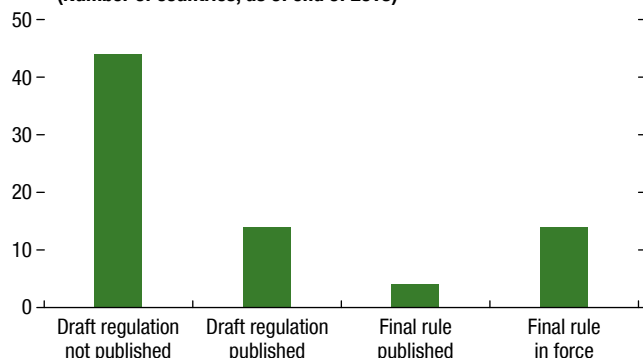
... although the net stable funding ratio remains a challenge.

**2. Emerging Implementation Delays for Net Stable Funding Ratio (Percent of total banking assets, as of March 2018)**



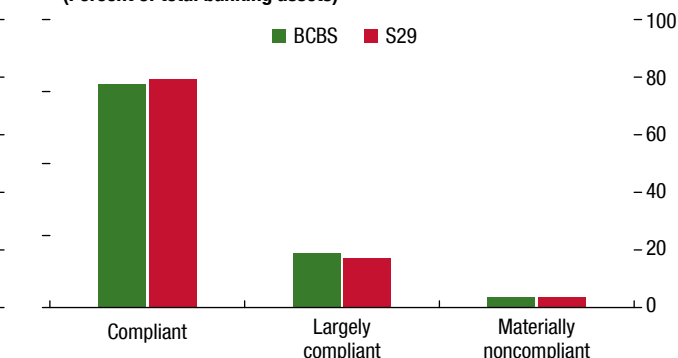
Many non-BCBS countries are following suit on liquidity standards ...

**3. Adoption by Non-BCBS Countries of Basel Liquidity Standards (Number of countries, as of end of 2015)**



... and at present, a large majority of bank assets reside in countries with good-quality liquidity regulation and supervision.

**4. Quality of Regulation and Supervision of Liquidity Based on FSAP Data (Percent of total banking assets)**



Sources: Basel progress reports; IMF, Financial Sector Assessment Program; IMF, 2017 Macroeprudential Survey; World Bank, Global Financial Development Database; and IMF staff calculations.

Note: In panel 4, the S29 is the group of 29 countries included in the Financial Stability Board Shadow Banking Monitor. Not all S29 and BCBS countries have been graded since the crisis. Panel 4 is based on the results of past and ongoing IMF FSAPs. BCBS = Basel Committee on Banking Supervision; FSAP = Financial Sector Assessment Program.

of the links between banks and sovereigns—an issue that will remain a challenge to authorities.<sup>28</sup> Banks' reliance on wholesale funding has been trending downward since the crisis (Figure 2.5, panels 3 and 4). However, internationally active banks domiciled outside the United States continue to rely on U.S. dollar funding, including through foreign exchange swaps, for their global dollar lending (see Chapter 1 of the April 2018 GFSR).

<sup>28</sup>The sovereign-bank linkages have proved particularly potent in cases when the domestic banking system is heavily exposed to sovereign debt and where the debt itself is assessed to be high risk.

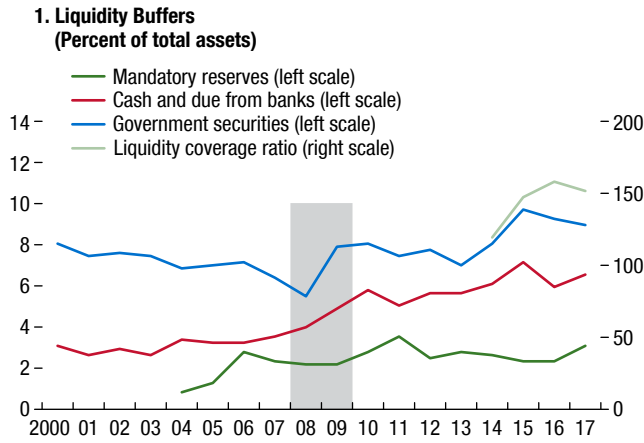
### *Nonbank Liquidity and Foreign Currency Risks*

New valuation guidelines for money market mutual funds have reduced run risks.<sup>29</sup> U.S. institutional money market funds that invest largely in less liquid corporate debt or municipal bonds have moved toward a mark-to-market basis, reducing the incentives of investors to run against the fund in times of stress. Boards of money market funds can also take measures,

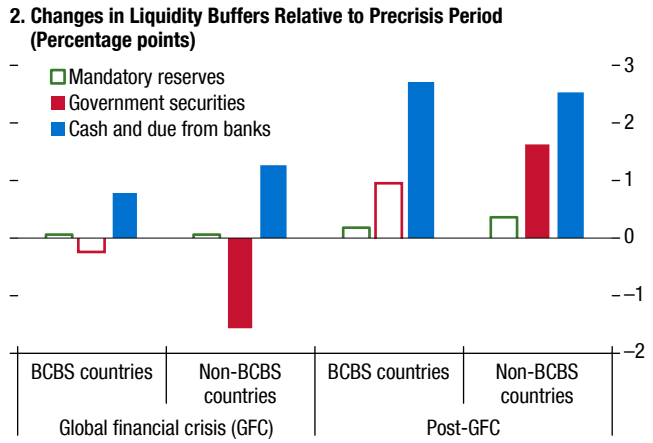
<sup>29</sup>Run risk is the risk that enough investors in the fund will withdraw their holdings at the same time to overwhelm the fund's holdings of liquid assets, forcing it to default to investors or sell illiquid assets, potentially threatening solvency.

**Figure 2.5. Liquidity Buffers and Reliance on Wholesale Funding**

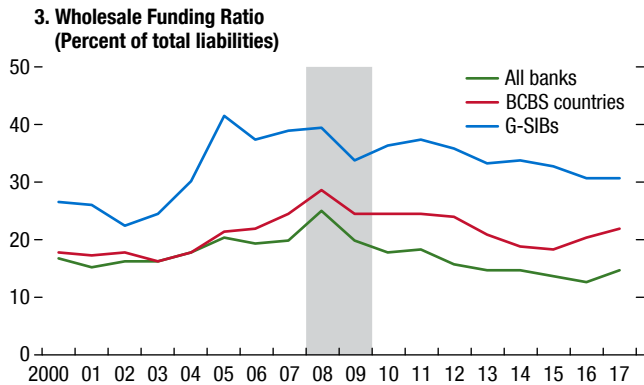
Banks' liquidity buffers have also increased since the crisis ...



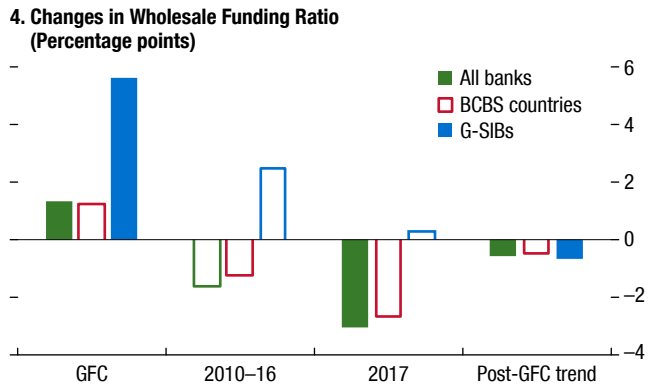
... resulting in significantly larger liquidity buffers after the crisis.



Banks' reliance on wholesale funding has also been declining ...



... reflecting a significant downward postcrisis trend.



Sources: Fitch Connect; and IMF staff calculations.

Note: Panels 1 and 3 correspond to the global median across medians at the country level for all countries in the sample. The shaded area denotes the global financial crisis (GFC). In panel 2, each bar represents the difference in means in the GFC and post-GFC periods relative to the pre-GFC period, and for BCBS and other countries. In panel 4, the first three sets of bars represent the difference in means in the GFC, the 2010–16 period, and 2017, all relative to the precrisis period (2000–07), for all banks, BCBS countries, and G-SIBs. The fourth set of bars represents the estimated annual trend during the postcrisis period. Solid bars indicate that the differences are statistically significant at the 10 percent level. BCBS = Basel Committee on Banking Supervision; G-SIBs = global systemically important banks.

such as liquidity charges and suspended redemptions, to address potential run risks. In Europe, most money market funds have also moved toward floating valuation, with exceptions for those investing in government debt, or those that can, like Chinese money market funds, show that they closely track advertised values. To reduce run risks, European regulations have also included potential redemption gates and liquidity charges.<sup>30</sup> The standards-setting body for securities supervisors, the

<sup>30</sup>As noted in Chapter 3 of the April 2015 GFSR, while gates and suspensions should be part of the toolkit, caution is needed in their use because they may send negative signals to the market and lead to preemptive runs ahead of them coming into force.

International Organization of Securities Commissions (IOSCO), has also contemplated additional guidelines. In the United States, reforms to the triparty repo market, including greater transparency about haircuts, rules aimed at reducing the riskiness of collateral, and new clearance procedures aimed at reducing intraday credit, have reduced potential run risks.

Many countries have also applied measures to contain foreign exchange risk. Foreign exchange risk is covered within the Basel capital framework, although the framework does not explicitly cover credit risk related to unhedged counterparties with foreign exchange exposures. Countries with elevated levels

of foreign exchange exposures have also long used measures now classified as macroprudential—such as reserve requirements differentiated by currency or higher risk weights for foreign exchange loans—to lean against foreign exchange risk.<sup>31</sup> In addition, more explicit macroprudential measures related to foreign exchange risk have been used. In Central and Eastern Europe, a wide range of tools were deployed to contain risks for foreign exchange–denominated mortgages. In Korea, leverage caps were imposed on banks’ positions in foreign exchange derivatives, and a levy was imposed on nondeposit liabilities denominated in foreign exchange, with shorter-term deposits attracting a higher charge than long-term ones.

### Enhanced Regulation of Large and Interconnected Institutions

Measures to address risks associated with large, interconnected, and complex institutions have largely focused on identifying systemic firms and imposing stricter regulatory and supervisory requirements on them. Agreement on the criteria, first developed by the IMF in conjunction with the FSB and Bank for International Settlements (BIS), and on the list of G-SIBs is an important success of the postcrisis reform agenda (FSB, IMF, and BIS 2009). G-SIBs are identified using indicators of size, interconnectedness, lack of readily available substitutes, global (cross-jurisdictional) activity, and complexity. Supervisory judgment, as an overlay, permits authorities to nominate banks to be included on the publicly disclosed list. G-SIBs have been subject to a systemic capital surcharge since 2016.<sup>32</sup> A list of global systemic insurers has also been developed, but not published, while work on capital standards, including higher loss absorbency for systemic insurers, is suffering delays. At a local level, many countries have adapted the G-SIB methodology to develop a framework for domestic systemically important banks (D-SIBs).<sup>33</sup>

<sup>31</sup>For example, Argentina applies limits on lending from foreign currency deposits.

<sup>32</sup>The BCBS sets surcharges ranging from 1 percent to 3.5 percent based on banks’ systemic importance; these surcharges have to be met in common equity. All banks designated as globally systemic are headquartered in BCBS member jurisdictions—Canada, China, France, Germany, Italy, Spain, Sweden, Switzerland, the United Kingdom, and the United States. However, after Nordea’s re-domiciliation is complete in late 2018, Sweden will no longer be home to a G-SIB.

<sup>33</sup>Australia and the EU use the four main categories of size, interconnectedness, substitutability, and complexity to frame their approach. Brazil uses a single indicator to balance coverage versus simplicity and transparency. The EU and Hong Kong SAR explicitly

Supervisory colleges and crisis management groups have been deployed. All G-SIB host jurisdictions should have both supervisory colleges and crisis management groups, where supervisors and other relevant authorities from home and host countries exchange information and views on supervisory issues and crisis preparedness and management. Successive FSAPs have been able to trace the increasing confidence and sophistication of the supervisory exchanges. Cooperation across borders and among supervisors has improved, with more open exchange.<sup>34</sup> Nevertheless, based on FSAP missions, continued progress is needed, and more open communication between authorities and the G-SIBs remains a priority area.

Systemic institutions have increased their capital buffers and banking systems appear to be slightly less concentrated today, but competition measures have not improved. Consistent with the introduction of additional regulatory capital surcharges, the postcrisis increase in capital buffers has been particularly substantial for G-SIBs, which have increased their regulatory capital ratios by 5 percentage points or more, compared with 1 percentage point for other institutions (Figure 2.6, panel 1).<sup>35</sup> Furthermore, the systemic importance of large institutions has not increased. On average, the moderate but sustained decline in the three-bank concentration ratio observed since 2000 continued (Figure 2.6, panel 2), and the size of systemic institutions relative to the economy has been declining or remaining stable in most countries, including those in the BCBS.<sup>36</sup> However, the trend in

---

consider supervisory judgment. Some jurisdictions, such as Brazil and Canada, set a surcharge equal to 1 percent of risk-weighted assets for all D-SIBs, whereas in the EU and Hong Kong SAR, a range of surcharges is used. Brazil and Hong Kong SAR have both followed the G-SIB lead and have created a category for which the highest surcharge has not—yet—been applied to any institution and is designed as an “empty bucket” to deter banks from becoming even larger or more interconnected.

<sup>34</sup>In the EU, legislation such as the Capital Requirements Regulation and the Capital Requirements Directive IV has done much to stimulate progress by underpinning EU supervisory relationships with a number of mandatory requirements. Also, the establishment of the SSM in the euro area in 2014 has enhanced supervisory relationships and cooperation in the region.

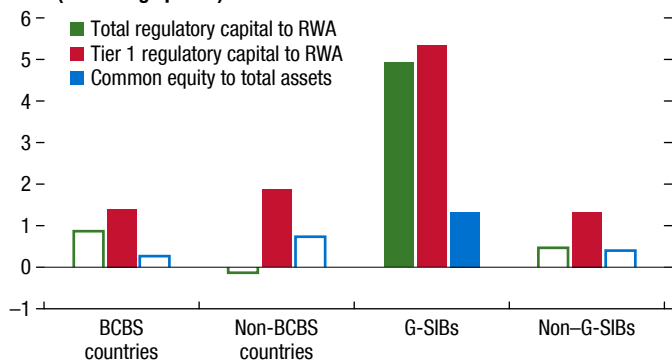
<sup>35</sup>However, regarding liquidity, Chapter 1 shows that some G-SIBs continue to hold substantial amounts of less liquid assets in relation to their capital, particularly in Asia-Pacific and Europe.

<sup>36</sup>The median ratio of G-SIB bank assets to GDP across 13 host countries declined by 0.4 percentage point, and that of D-SIBs by 0.1 percentage point over 39 countries. The asset-to-GDP ratio of G-SIBs declined in 8 of the host countries, and it did so for D-SIBs in 19 of the countries.

**Figure 2.6. Banking Concentration and Competition and Capital Buffers of G-SIBs**

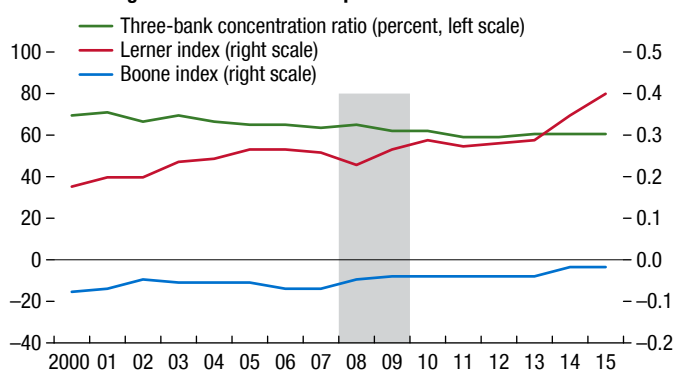
Thickening of capital buffers has been notable for systemic banks.

**1. Postcrisis Differences across Countries and Banks (Percentage points)**



Concentration within the banking sector has fallen slightly, although competition has not picked up.

**2. Banking Concentration and Competition**



Sources: World Bank, Global Financial Development Database; and IMF staff calculations.

Note: In panel 1, each bar represents the coefficient of the post-global financial crisis (GFC) dummy variable, that is, the difference in means in the postcrisis period (2010–17) relative to the precrisis period. Solid bars indicate that the coefficients are statistically significant at the 10 percent level. Panel 2 shows the medians across all countries in the sample. The Lerner index is a measure of bank markups, the difference between output prices and marginal costs (estimated from a translog cost function). A higher value is associated with lower competition. To express it in percentage points, the Lerner index was multiplied by 100. The Boone indicator is a competition measure based on the elasticity of bank profits to marginal cost. A more negative value is consistent with greater competition because inefficient banks are punished more harshly through lower profits. The shaded area refers to the GFC. BCBS = Basel Committee on Banking Supervision; G-SIBs = global systemically important banks; RWA = risk-weighted assets.

concentration has not clearly translated into greater banking competition, as both the Lerner index, a measure of banking sector markups, and the Boone indicator, a measure of elasticity of profits to marginal costs, appear to have markedly increased in recent years.<sup>37</sup>

Important progress has been made in addressing key data gaps for systemic institutions, though the task is yet to be completed. The data hub for G-SIBs contemplated in the Data Gaps Initiative (see Box 2.2) has been set up at the Bank for International Settlements, thereby providing supervisory authorities in major jurisdictions the ability to contribute to and access a common database on risk exposures and interconnectedness across systemically important financial institutions, markets, and jurisdictions. Two key areas for further progress stand out: increasing the granularity of data accessible to international financial institutions and increasing access to aggregate data by national macroprudential authorities.

**Better Supervision of a Complex Financial System**

*Intensifying Supervision*

One of the earliest postcrisis messages from the IMF was that supervisors needed to impose intense scrutiny on banks, coupled with the will and the ability to act. The revised sectoral standards also embodied this approach, with an emphasis on timely and effective supervision rather than regulations alone. These standards require greater attention to be focused on systemic institutions and risks. Many supervisory authorities have refreshed their approaches to examine systemic institutions more rigorously. For example, the United States launched the Comprehensive Capital Analysis and Review to examine the resilience of its major institutions more rigorously. Some jurisdictions, such as Brazil, have segmented, or tiered, their institutions. In the euro area, supervision is predicated on the systemic significance of institutions. Russia has centralized the supervision of its systemic banks. FSAPs

<sup>37</sup>The Lerner index is defined as the difference between output prices (the ratio of total bank revenue to assets) and marginal costs (from an estimated translog cost function, and scaled by output), as a ratio of assets. The Boone indicator is the estimated coefficient from a log regression of bank profits on marginal costs. See Demirgüç-Kunt and Martínez Pería (2010) and Leon (2014) for details. Similar patterns emerged when cross-country averages that weigh each country by the size of its banking system were computed.



have investigated how supervisory intensity has been interpreted and have considered its adequacy, often noting insufficient resources for supervisors, for example, in China, the Netherlands, Sweden, Switzerland, and the United Kingdom.<sup>38</sup> Overall, concerns were expressed in one-quarter of the postcrisis FSAPs of systemic jurisdictions that the right balance of supervisory resources was not being devoted to systemic institutions or that supervision of them was not sufficiently intense. Factors have also been identified in a number of jurisdictions that could compromise the independence of the supervisory authorities, a key weakness in ensuring financial stability.<sup>39</sup>

### *Expanding the Regulatory Perimeter*

Incentives to move bank activities to off-balance-sheet vehicles to benefit from regulatory arbitrage have been curtailed. The loopholes used by banks to game the Basel I and II capital frameworks by moving items off the balance sheet and setting aside only moderate resources for potential liquidity support have been closed in Basel III (FSB 2017a). New rules on the treatment of special purpose vehicles reduced the profitability of using them as conduits for capital arbitrage and made them less attractive. Off-balance-sheet exposures are now captured on a more rigorous basis by the capital framework. Establishing a liquidity framework that considers the volatility of different funding sources has thrown a spotlight on bank use of nonbank financing, bringing this previously largely unmonitored risk within the perimeter. In the United States, the movement of investment banks toward traditional banking licenses after the global financial crisis also brought more institutions within the more tightly regulated part of the regulatory perimeter.

Systemic risk monitoring has been expanded to include shadow banking and market-based finance. The international community has made considerable progress in measuring the size and growth of the shadow banking sector and identifying its main risks, which provide a basis for regulation to contain those risks.<sup>40</sup> These risks have risen rapidly in emerging mar-

kets, particularly in China where they could become globally systemic risks. The FSB has established a typology and a broad framework for such regulation, and IOSCO has also published recommendations on issues such as liquidity mismatch between fund investments and redemption terms, leverage within investment funds, operational risk, and securities lending. IOSCO has also been working to transform its recommendations into operational guidance. The proposed remedies are reporting, monitoring, risk management, stress testing, and deeper liquidity buffers. Some jurisdictions have implemented measures to address some of these risks, but regulatory advances remain limited to date.<sup>41</sup> Efforts should continue to improve the timeliness of data and the granularity of the information on interconnections, especially cross-border ones.

The regulatory framework for securitization has been overhauled. The direction of regulation was clear: institutions participating in the securitization market needed to take greater responsibility for their business decisions, show greater transparency, reduce complexity, and engage in less mechanistic reliance on outside agents—such as the ratings from credit agencies. Under the new standards, banks originating securitizations must also retain part of the original structure. Implementation of the revised securitization framework is still in progress, with the rules for these standards yet to be finalized and not yet in force in many jurisdictions. Going ahead, it is crucial to ensure that retention rules adequately align the incentives of securitization sponsors, an issue that has been debated regarding existing rules in some jurisdictions.

There has been important progress in the migration of OTC derivative trading to central counterparties (CCPs) and reporting to trade repositories. Failures in risk management and transparency in OTC derivatives markets led to a call to migrate this activity to CCPs. The crisis demonstrated that financial market infrastructures (FMIs) such as CCPs played a critical role in underpinning stability by reducing uncollateralized counterparty exposures across the financial system, thereby significantly attenuating the contagion of losses

<sup>38</sup>The United Kingdom finding was in the postcrisis FSAP before the creation of the Prudential Regulation Authority.

<sup>39</sup>FSAPs have identified these challenges in Australia, Canada, China, France (before the Single Supervisory Mechanism), Hong Kong SAR, Japan, Korea, Luxembourg, Mexico, the Netherlands, Saudi Arabia, Singapore, South Africa, Spain, Sweden, and Turkey.

<sup>40</sup>See Chapter 2 of the October 2014 GFSR. Continuation of this effort has taken place under the auspices of the FSB, which coordi-

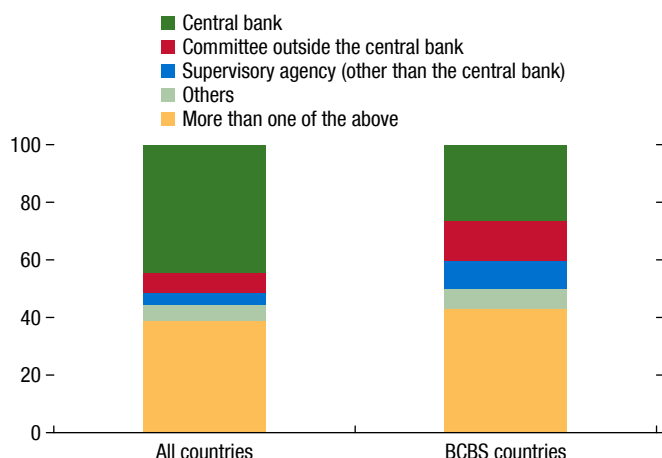
nates the gathering of information on nonbank financial intermediaries through the Global Shadow Banking Monitoring Report.

<sup>41</sup>For instance, in the United States, measures to widely institutionalize the practice of swing pricing targeted at attenuating run-risk incentives were introduced by the Securities and Exchange Commission in 2016 and have reportedly been adopted by all large asset management firms. Compliance across the industry is expected by the end of 2018.

**Figure 2.7. Macroprudential Policy Frameworks**

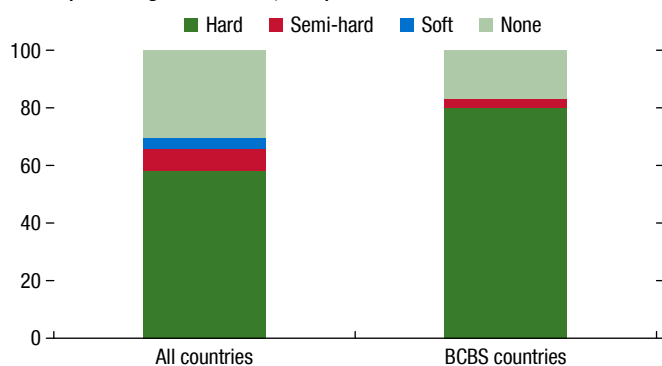
Countries have designated a macroprudential authority in a variety of ways ...

**1. Designated Macroprudential Authority (Percentage of countries, 2017)**



... and have granted them substantial powers to promote financial stability.

**2. Macroprudential Authorities' Powers (Percentage of countries, 2017)**



Source: IMF, 2017 Macroprudential Policy Survey.  
 Note: BCBS = Basel Committee on Banking Supervision.

from spreading. Consequently, the Pittsburgh G20 Summit pressed for regulation, as opposed to voluntary change, to support the development of FMIs. OTC contracts were to be reported to trade repositories and all standardized OTC contracts were to be cleared on CCPs by end-2012.<sup>42</sup> There has been important progress on this front (FSB, BIS, and IOSCO 2018).

<sup>42</sup>In a market cleared by a CCP, participants are no longer exposed to one another because the CCP becomes the single counterparty to all trades. Counterparty risk is reduced by the margining practices and guarantee funds of the CCP, and the multilateral netting between members lowers gross exposures and increases efficiency.

Furthermore, reflecting their new centrality, financial buffers at most CCPs deemed systemic have been beefed up and other buffers, such as liquidity support, have been strengthened.<sup>43</sup>

An important example of inherent difficulties is reform of credit rating agencies. These agencies are generally paid by an issuer to rate that issuer's securities, creating well-recognized incentives problems. In addition, the reliance on credit ratings as a basis for capital charges exposed the users of the ratings to the failures of and weaknesses in the agencies' models. Regulatory efforts to address these shortcomings have led to some successes, with a new code of conduct and better oversight as well as reduced use of ratings in some parts of the regulatory standards. Nevertheless, the service performed by the credit rating agencies has not been substituted by other agents, and they retain a central role in the financial system.

**A Macroprudential Approach to Systemic Risk**

Since the global financial crisis, most countries have instituted systemic oversight authorities. Detailed arrangements vary across jurisdictions, but in most cases this role has been assigned to the central bank (Figure 2.7, panel 1), especially when the central bank oversees prudential supervision (as in the United Kingdom). Committees outside the central bank are the second most prevalent form of organization.<sup>44</sup> In Mexico, for example, the Financial System Stability Council has nine members, including representatives from the finance ministry, the central bank, the deposit insurance agency, and prudential supervisors. The United States has a similar arrangement with the Financial Stability Oversight Council, though it also incorporates additional representatives. China, too, has recently instituted the Financial Stability and Development Committee, bringing together its key supervisors. However, in other countries with separate authorities, such as Brazil and Canada, no explicit macroprudential

Market transparency is enhanced through the centralized administration of members' positions.

<sup>43</sup>Central banks in Europe provide, under strict criteria, liquidity support to CCPs and accounts to manage cash collateral. In the United States, the Federal Reserve allows them to open and maintain accounts but not to access routine intraday credit.

<sup>44</sup>The stresses of the global financial crisis caused many countries to reassess the organizational structure of financial supervision. Some countries chose to move supervision into the central bank, while others chose to separate responsibilities. No preferred model has emerged for the structure of supervision. In particular, different countries have established bank resolution authority in various areas.

mandate has been given, and macroprudential responsibilities are shared among agencies. The IMF, via technical assistance, Article IV missions, and the FSAP, has worked with many countries to design macroprudential agencies and develop systemic risk monitoring capacity.

The powers of established macroprudential authorities to contain systemic risk vary greatly across jurisdictions. Most authorities have some hard powers (Figure 2.7, panel 2). These range from the United States, where the Financial Stability Oversight Council has the power to designate systemic financial institutions and subject them to enhanced supervision by the Federal Reserve or, in the case of financial market utilities and infrastructures, to enhanced risk management, to the Monetary Authority of Singapore, which has the full range of macroprudential tools at its disposal. Other authorities only have semi-hard powers, such as comply-or-explain mechanisms. In India, the Financial Stability and Development Council is a coordinating entity for macroprudential policy, and hard powers are left to the individual supervisors. Soft powers include informing the relevant hard-power agency and the public of potential risks. In the United States, as well as in Russia and South Africa, this role of informing the supervisors also includes a responsibility to advise relevant agencies on which policy steps should be taken. Although even soft powers can be effective if exercised correctly, macroprudential authorities in many jurisdictions still lack powers and tools. This is an area that needs to be addressed.

### Governance and Compensation as an Overarching Control on Risk Taking

The scope of bank supervision has extended to include aspects of corporate governance, and the Basel Core Principles for Banking Supervision (Core Principles) have become more demanding in this area. After the crisis, there was wide recognition that banks' corporate governance should more seriously consider risk appetite and management.<sup>45</sup> More than half of the FSAPs in 25 systemic jurisdictions between 2011 and 2018 identified gaps, deficiencies, or weaknesses in cor-

<sup>45</sup>The Organisation for Economic Co-operation and Development (OECD) and the BCBS both issued revised corporate governance standards. The BCBS's 2015 standards (Corporate Governance Principles for Banks) focus on addressing failings in executive management and boards of directors. Essential elements of these principles were folded into the revised Basel Core Principles.

porate governance in the financial sector. Progress can also be identified, however. By 2017, most jurisdictions had regulations addressing compensation packages in the financial sector, and an FSB stocktaking of governance practices in major banks found that most now recognized the board's responsibility, supported by committees, to determine an appropriate level of risk taking. Most jurisdictions by that time also required independent directors to chair key board committees, and additional efforts were supported by legislative and supervisory initiatives. By 2018, for example, the Single Supervisory Mechanism had already carried out thematic reviews of governance in banks in the euro area; the Russian authorities were newly empowered with relevant legislation; and the Brazilian supervisory agency had intensified and reorganized its supervisory processes, taking corporate governance findings as the foundation for its assessments.

Reform of compensation practices remains untested, though studies, including by the IMF, have sought to examine the impact of these reforms (see Chapter 3 of the October 2014 GFSR). Although almost all major FSB member jurisdictions have substantively implemented the principles for sound compensation practices and their implementation standards (FSB 2017d), the legal enforceability of some key measures, such as malus and clawback of compensation paid in light of the discovery of deficient performance, is not yet clear. Moreover, there is the inherent risk that compensation contracts can be reengineered to get around such clauses and regenerate excessive risk-taking incentives.

### Overhauling Resolution Frameworks for Systemic Financial Institutions

The widespread assumption that the government stood behind many large institutions—borne out repeatedly during the crisis—created moral hazard. Following the crisis, it became clear that the resolution framework for large institutions was inadequate and political support for bailouts evaporated. Regulators moved to develop a system for managing the failure of financial institutions in which investors would bear more risk and taxpayer support would be minimized. The adoption by the FSB of the Key Attributes of Effective Resolution Regimes for Financial Institutions provided a benchmark for resolution authorities to have the tools to enable them to

quickly resolve nonviable systemic financial institutions while maintaining the continuity of functions critical for financial stability and the functioning of the real economy.<sup>46,47</sup>

As noted by the FSB, and confirmed in recent FSAPs, enhancement of resolution regimes continues to progress, albeit at an uneven pace (Box 2.3). Most jurisdictions in which G-SIBs are domiciled have introduced all, or nearly all, of the bank resolution powers advocated by the Key Attributes, while many other FSB members are actively pursuing reforms. The IMF has also worked with country authorities outside the FSB, via FSAPs and technical assistance, to make regimes more predictable, effective, and transparent. The adoption of the Total Loss-Absorbing Capacity (TLAC) standard, which requires G-SIBs to maintain a certain amount of liabilities that can be used at the point of failure to absorb losses, recapitalize the failing firm, and reduce potential calls on public resources, has been an important milestone toward ensuring the resolvability of G-SIBs (FSB 2015).<sup>48</sup> Implementation is well under way, with several FSB member jurisdictions (for example, Canada, Sweden, Switzerland, the United Kingdom, and the United States) already having incorporated TLAC requirements into domestic rules and regulations, and others (for example, the EU and Japan) having issued policy proposals. Significant amounts of TLAC-eligible securities have been issued in recent years, with many G-SIBs already meeting the January 2019 requirement.<sup>49</sup> Similarly, all G-SIBs

have established recovery plans, while resolution plans are being finalized. However, less progress has been made in strengthening resolution regimes for systemic nonbanks.

Changes in banks' ratings and market prices suggest that the likelihood of government support and bailouts for banks, especially the largest ones, is perceived to have fallen since the crisis. Banks' support rating—an assessment of the likelihood that a bank will receive extraordinary support from either a parent bank or the government—is markedly lower today than before the crisis for stand-alone banks, which do not have a parent and could only receive extraordinary support from the government (Figure 2.8, panel 1). A market measure of the implicit subsidy from which systemic banks benefit as a result of possible government bailout also suggests a lower likelihood of bailout, falling visibly from its highs during the crisis (Figure 2.8, panel 2).<sup>50</sup> This is particularly so in the euro area, where the implicit subsidy reached 194 basis points at the end of 2011, and is now slightly less than 18 basis points.

Concerted efforts remain necessary, however, to achieve the stated objectives of the resolution reforms, especially for cross-border issues. Even in many systemic financial sectors, FSAPs have found that national bank resolution regimes often have significant weaknesses and are not fully aligned with the Key Attributes. Resolution regimes for nonbanks (especially systemically important insurers and financial market infrastructure) need to be finalized (see FSB 2016, 2017c). Remaining impediments to resolvability, such as group structures that hinder orderly resolution and adequate loss-absorption capacity at non-G-SIBs—whose failure may also lead to systemic stress—should be addressed. Initiatives are under way to improve funding sources for the time of resolution. Cross-border resolution remains an important gap: information sharing is impeded by confidentiality issues; there is a need for greater coordination and planning in how cross-border resolution for G-SIBs would be conducted; and crisis management groups should be established for systemic nonbanks such as insurers and CCPs.

<sup>46</sup>The global financial crisis added new impetus to efforts led by the IMF to develop and promote a framework for cross-border insolvency of financial firms in major jurisdictions, which dated back to the early 2000s.

<sup>47</sup>The Key Attributes provide 12 essential features of effective resolution regimes that can be clustered in four broad categories: (1) strengthened national resolution regimes (for example, resolution authorities, powers, safeguards, and funding mechanisms), (2) recovery and resolution planning, (3) arrangements for enhanced cross-border cooperation, and (4) access to information and removal of barriers to information sharing.

<sup>48</sup>The TLAC standards envisage phased implementation. Institutions classified as G-SIBs before the end of 2015 (except for those headquartered in emerging markets that benefit from an extended implementation period) need to establish the TLAC standard of 16 percent of risk-weighted assets beginning January 2019 and 18 percent beginning January 2022.

<sup>49</sup>Banks have approached the requirement to issue long-term subordinated debt in varying ways, with some European banks issuing 10-year bullet-maturity bonds, while some U.S. banks have issued bonds callable at one- or two-years' remaining maturity. Banks from emerging markets have been granted a longer adjustment period, and Chinese G-SIBs have not yet sold TLAC-eligible debt.

<sup>50</sup>The implicit subsidy is computed as the difference between a "fair value" credit default swap (CDS) spread (obtained from contingent claim analysis) and the observed CDS spread on bank bonds. This analysis follows and updates that of Chapter 3 in the April 2014 GFSR.

## Regulatory Efforts Going Forward: Where to Focus?

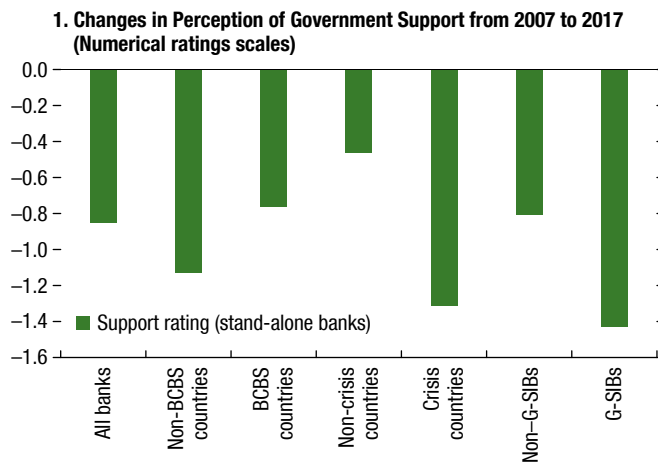
### Complete the Global Regulatory Reform Agenda

Incomplete aspects of the global regulatory agenda should be fully implemented. As discussed in the previous section, despite great progress, many aspects of the reform agenda are still in process and must be adequately completed. These include solvency frameworks for insurers, the leverage ratio, and outstanding items on the liquidity agenda. Continuing to intensify supervision, particularly of systemic institutions, remains important. Macroprudential oversight and policy tools are improving, but the key challenge is ensuring accountability and willingness to act in a timely manner. Cross-border cooperation in data sharing and systemic risk oversight should also be further developed. Corporate governance should ensure that cultures of excessive risk taking can be reined in, and that boards are held accountable for doing so, and difficult issues, such as compensation and the use of credit ratings, should be confronted. Finally, resolution frameworks consistent with the Key Attributes should continue to be implemented, and those for systemic entities should be improved; this is particularly important for cross-border institutions such as banks.

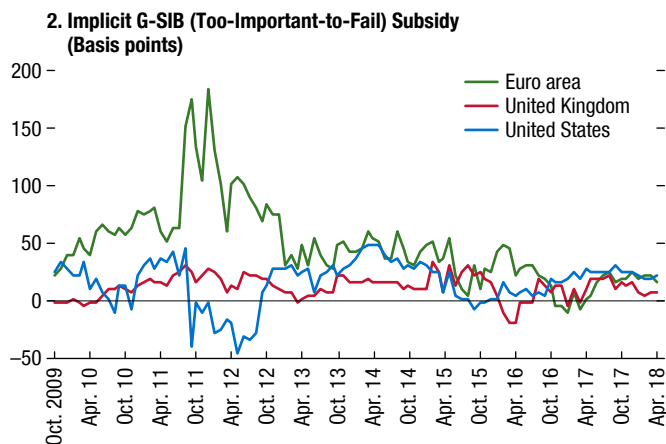
Improvements in oversight and regulation of shadow banking should continue. According to FSB (2017a), the aspects of shadow banking that contributed most to the global financial crisis generally no longer pose financial stability risks. However, in many countries, systemic risks associated with new forms of shadow banking and market-based finance outside the prudential regulatory perimeter, such as asset managers, may be accumulating and could lead to renewed spillover effects on banks (Figure 2.9, panels 1 and 2). This is particularly true in many emerging markets, including China, where shadow banking has grown rapidly, albeit from a small base (see Chapter 2 of the October 2014 GFSR). Concerns about the resilience of liquidity could expose asset managers to fire sale losses if redemptions are large, with potential spillovers to other intermediaries (see Chapter 1 of this GFSR and Chapter 2 of the October 2015 GFSR). Numerous policy and regulatory options for reducing shadow banking risks could be envisaged, including activity-based (as opposed to entity-based) regulation and development of macroprudential tools for nonbanks. Closing data gaps is also key to these efforts (see Chapter 3 of the April 2015 GFSR).

**Figure 2.8. Perceptions of Likelihood of Bailout of Systemic Institutions**

Bank ratings suggest that it is now less likely for systemic institutions to be bailed out ...



... a perception that is echoed by a decline in market-based measures of the implicit subsidy that arises from possible bailout.



Sources: Fitch Ratings; Moody's CreditEdge; and IMF staff calculations. Note: In panel 1, the first bar represents the difference in means for all banks between 2007 and 2017, and the remaining bars represent this difference for different groups of countries and banks. The support rating reflects a view on the likelihood that a bank will receive support from either a parent bank or the government, ranging from a likelihood of 1 (low) to 7 (high). Stand-alone banks refer to banks without a parent. Solid bars indicate that the differences are statistically significant at a 10 percent level. In panel 2, the implicit subsidy is calculated as the difference between the "fair value" credit default swap (CDS) spread obtained from equity prices and the CDS spread on a bank's bonds. A higher difference implies a higher implicit too-important-to-fail subsidy. BCBS = Basel Committee on Banking Supervision; G-SIBs = global systemically important banks.

Policies aimed at addressing the links between banks and sovereigns should be designed with a holistic perspective. Banks' government bond holdings are still large (Figure 2.9, panel 3, and Chapter 1 of this GFSR). Sovereign bonds play a prominent role as safe and liquid assets in the new liquidity regulations, receive favorable treatment in capital regulations (often with a risk weight of zero), and are exempted from concentration limits. At the same time, the resulting interconnection between banks and the sovereign may result in a negative feedback loop, where a banking or sovereign crisis can reduce the value of government bonds, thereby deepening the decline in banks' asset values and further affecting sovereign bonds.<sup>51</sup> Dell'Ariccia and others (2018) argue that improving balance sheets of banks and sovereigns is key, but that policies that discourage banks from holding excessive sovereign bonds can also improve financial stability and market efficiency, emphasizing they should be designed to minimize possible procyclical effects.

Reform fatigue and rollback pressures, already visible, should be resisted. The postcrisis agenda was very wide-ranging, and the sheer volume of new measures has tested financial institutions and supervisors. As memories of the global financial crisis fade, fatigue with ongoing implementation is rising and warnings about new risks are less likely to be heeded. These tendencies, as well as pressures to roll back the agenda, should be resisted. In particular, supervisory oversight of major banks should not be reversed; supervisory intensity, especially onsite and for systemic banks, should not be weakened.

### Address the Consequences of the Postcrisis Regulatory Agenda

After 10 years, an evaluation of the effectiveness and efficacy of the reforms is appropriate. The regulatory reform agenda was set in place to increase the resilience of a global financial system that was deeply affected during the crisis. Of course, heightened resilience

might come at some cost to efficiency that needs to be weighed against financial stability gains. Although the calibration of the regulatory response was not oblivious to this trade-off, an ex ante assessment of a reform of the breadth and depth of that undertaken was nearly impossible. Now that the core parts of the agenda are in place, supervisors can start taking stock of the effect of regulations on the broader economy, with measures fine-tuned accordingly. Indeed, the FSB has started this process through dedicated working groups, and the IMF is leveraging the FSAP to conduct these assessments in countries with adequate data.<sup>52</sup>

New risks arising from a bigger role of CCPs in derivative markets should be addressed. Following the 2009 G20 mandate to centrally clear all standardized derivatives contracts through CCPs, counterparty risk and leverage have decreased, reducing systemic risk. However, this has led to a concentration of credit risk within CCPs as they gained importance (Figure 2.9, panel 4). Given their close interconnections with banks and other market participants, a failure of a CCP to absorb losses could amplify adverse aggregate shocks (Committee on Payment and Settlement Systems 2010). Also, margin calls and haircuts tend to rise as the financial cycle worsens, potentially leading to procyclicality. It is therefore important that regulation and supervision of CCPs ensure that their capital and liquidity buffers are solid, and adequate resolution frameworks are in place that consider the cross-country nature of these entities. Some of these risks could also be addressed using macroprudential tools. Finally, provision of central bank liquidity to solvent and systemic CCPs could be considered under extreme circumstances to safeguard financial stability (Wendt 2015).<sup>53</sup>

In countries affected by a withdrawal of correspondent banks, authorities should address possible consequences for financial stability and inclusion. The regulatory reform agenda, along with money-laundering rules and other factors, may have contributed to the reassessment of correspondent banking relationships that has affected access to the global financial system for residents of some countries

<sup>51</sup>This can occur either because the fiscal cost of potential sovereign guarantees to the banking sector (whether explicit or implicit) may hinder fiscal solvency or the crisis may have an impact on real activity and government revenues. For instance, studies on the European sovereign debt crisis show that less strongly capitalized banks reduced loans and increased lending rates more sharply than did less exposed banks, and hence amplified the effect of sovereign stress on lending (Altavilla, Pagano, and Simonelli 2016; Georgoutsos and Moratis 2017).

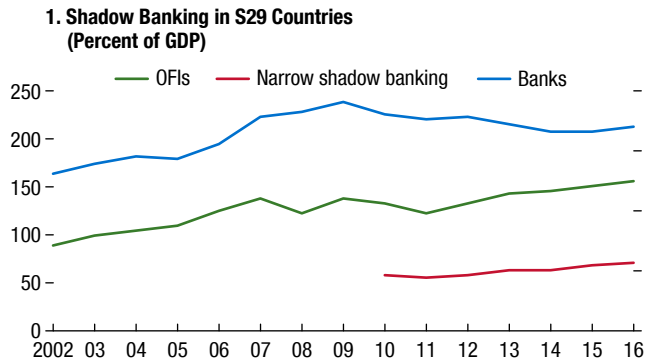
<sup>52</sup>For instance, the recent Peru FSAP used microeconomic data to evaluate the impact of higher capital requirements on lending, finding only small transitory effects.

<sup>53</sup>Some jurisdictions, including Australia, the euro area, Switzerland, the United Kingdom, and the United States, already consider the possibility of providing emergency liquidity support to domestic financial market infrastructures.

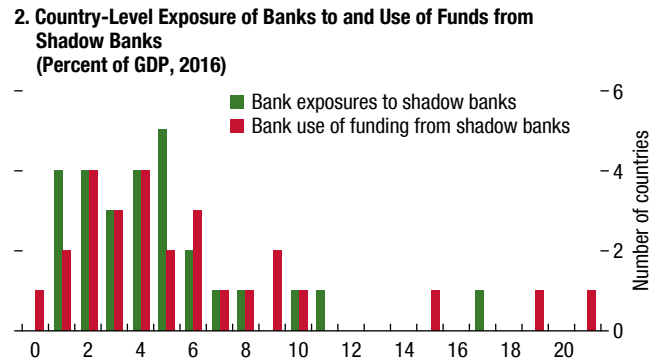


**Figure 2.9. New Sources of Risk and Vulnerabilities**

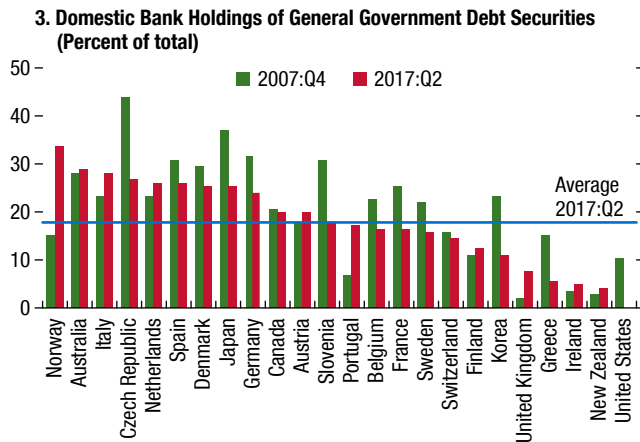
As assets of conventional banks stagnate, nonbank institutions gain ground ...



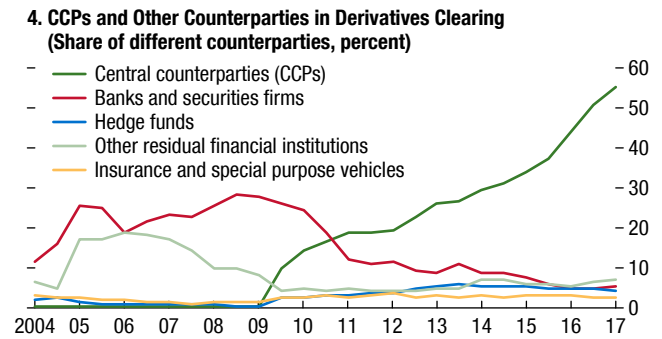
... and banks' interconnections with these institutions can be large in some countries.



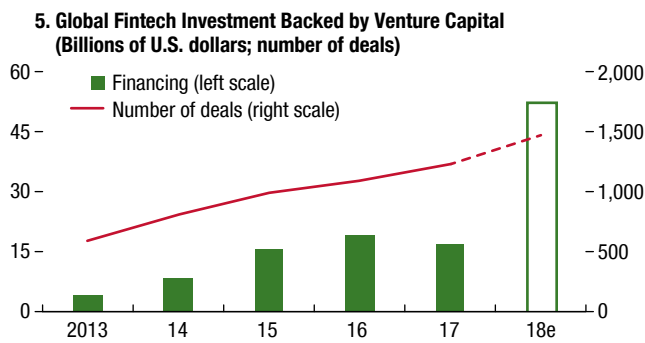
In many countries, the bank-sovereign nexus remains strong.



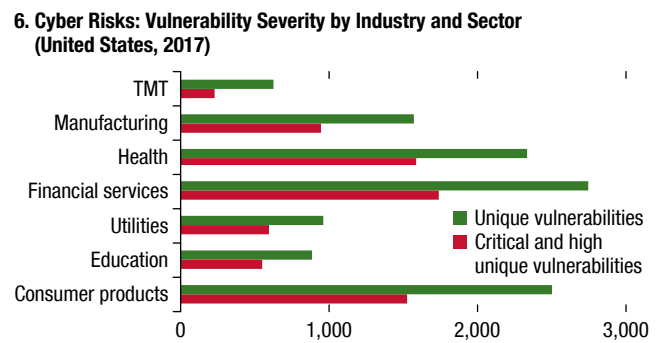
The systemic importance of central counterparties is growing rapidly ...



... and financial technology (fintech) is rapidly making inroads.



Cyber risk can be sizable, and not all economic sectors are equally vulnerable.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; CB Insights; Financial Stability Board; Protiviti; and IMF staff calculations. Note: In panel 1, shadow banking is computed from the Financial Stability Board Shadow Banking Monitor 2017 for a group of 29 countries (S29). Panel 2 shows the distribution of the banking system's exposures to and use of funds from shadow banks across the S29 countries. In panel 3, bank holdings of general government debt are based on updated statistics from Arslanalp and Tsuda (2014). In panel 4, the role of central counterparties is from the Bank for International Settlements Quarterly Review of June 2018 (Figure 2). In panel 5, the growth of fintech investments is from CB Insights' Global Fintech Report of 2018:Q1, showing annual venture capital-backed global fintech deals and financing (2018 full-year data are extrapolated from 2018:Q1). In panel 6, cyber risk vulnerability severity is from Protiviti's 2018 Security Threat Report. OFI = other financial institutions; TMT = technology, media, and telecom.

(see Chapter 1 of the October 2018 GFSR).<sup>54</sup> In some cases, this has led to a migration of risks to nonbanks, which may require a reevaluation of the regulatory perimeter. In others, where overall access to financial services has been reduced, country authorities should step in to support financial inclusion. The IMF has tried to help affected countries strengthen their legal, prudential, and supervisory frameworks through FSAPs and technical assistance.

### Confront New Risks

New financial technology (fintech) poses challenges as well as opportunities, while cybersecurity risks should be addressed. While fintech—encompassing activities such as big data, automation of loan processing, distributed ledger technology, and new lending and electronic trading platforms—is still small, it has grown rapidly (IOSCO 2017; Figure 2.9, panel 5). The regulatory challenge is to support fintech's potential contribution to innovation, efficiency, and inclusion, while safeguarding against risks that could amplify shocks to the financial system (FSB 2017b). Given the increasing reliance of the financial sector on information technology and interconnectedness of systems, cyber threats could pose financial stability risks (Figure 2.9, panel 6). The direct cost of cybersecurity events could be large, and indirect costs, such as reputational risk, further raise the stakes (Kopp, Kaffenberger, and Wilson 2017; Bouveret 2018). Supervisors must engage with financial institutions to develop identification, response, and recovery capabilities. Unfortunately, supervisors often lack dedicated units and skills shortages are widespread.

### Conclusion

Ten years after the onset of the global financial crisis, progress is clear, but the reform agenda must be completed. The broad agenda set by the international community has given rise to new international standards, guidance, and best practices. Implementation of measures for capital, liquidity, and systemic oversight have been successful, and vulnerabilities related to

derivatives and wholesale funding have been reduced. The FSAP, given its coverage of the entire sector, has helped support and evaluate the implementation of these reforms in both FSB and non-FSB economies. This chapter has documented important progress in all areas of the reform agenda, but it has also shown that gaps remain across a range of areas, from macroprudential frameworks and systemic risk monitoring to data and cross-border cooperation. Bank compensation practices and the use of credit rating agencies are particularly thorny issues for which existing progress must be consolidated, and new thinking may be necessary.

Regulators and supervisors must be able to respond to new threats. The risks of rollback, waning multilateralism, and regulatory fatigue are real and could easily undermine the important progress made in improving financial stability. In addition, new risks are emerging as the financial system adapts to new regulations and structural change takes place. OTC derivatives trading through CCPs has enhanced counterparty risk management but has concentrated potentially systemic risk in these entities. The growth of credit intermediation by nonbank financial institutions has not been adequately matched by regulators' ability to monitor risks and act through regulation and supervision as needed. The development of fintech has been rapid. Despite its potential benefits, our knowledge of its potential risks and how they might play out is still developing. Increased cybersecurity risks pose challenges for financial institutions, financial infrastructure, and supervisors. These developments should act as a reminder that the financial system is permanently evolving, and regulators and supervisors must remain vigilant to this evolution and ready to act if needed.

Above all, regulators must avoid complacency. No financial regulatory framework can or should aim to reduce the probability of crisis to zero, so regulators should remain humble. The current regulatory reform agenda was designed to compensate for weaknesses that led to the global financial crisis, and the measures taken have contributed to a less leveraged, more liquid, and better supervised financial system. However, risks tend to rise during good times, such as the current period of low interest rates and subdued volatility, and those risks can always migrate to new areas. Supervisors must remain vigilant to these unfolding events (see also the policy discussion in Chapter 1 of this GFSR).

<sup>54</sup>Fragile states under sanctions or facing civil unrest are among those that have been the most affected. Among small states, African, Pacific, and Caribbean islands have experienced the largest declines in correspondent banking value over the 2012–15 period (IMF 2017).

### Box 2.1. The IMF's Role in the Global Regulatory Reform Agenda

The Washington Summit of 2008 launched the international regulatory reform agenda “to achieve needed reforms in the world’s financial systems.”<sup>1</sup> This agenda was refined through successive Group of Twenty (G20) summit meetings. In addition to commitments by jurisdictions, the international bodies were mobilized and tasked with supporting the reform, taking on roles consistent with their respective mandates.

The IMF’s focus was on surveillance of international and domestic financial systems, assessment of the implementation and implications of financial sector policies, and identification of macrofinancial risks and vulnerabilities. Surveillance and assessment work complemented that of the Financial Stability Forum (FSF), which was reconfigured as the Financial Stability Board (FSB), beginning in 2009. Charged with the coordination and elaboration of financial sector and regulatory and supervisory policy, the FSB oversaw the technical work of the regulatory reform agenda that was largely undertaken by the working structures of the international standards-setting bodies. The standards setters included the Basel Committee on Banking Supervision, which was tasked with enhancing the capital adequacy framework, one of the first objectives of the reform, but also included the International Organization of Securities Commissions and the International Association of Insurance Supervisors.

From the outset, the IMF’s macrofinancial expertise was recognized as complementary to the development of regulatory policy. The IMF was called on to work in collaboration with the FSF/FSB to enhance efforts to better integrate regulatory and supervisory responses into the macroprudential policy framework and to conduct early warning exercises. It was asked to work with the FSF/FSB and others to draw lessons from the crisis, consistent with its mandate.

Contributing to the intellectual debate, the IMF has published on topics related to its role in the international collaboration.<sup>2</sup> The evolution of macropruden-

tial policy frameworks has become a keystone of the IMF’s response to addressing systemic risk. Themes of the IMF papers published in the years following the crisis covered the reform agenda more broadly, including identification of gaps in regulatory architecture; systemic institutions; the importance of coordination, cooperation, and removal of obstacles to information sharing in all dimensions of regulation and supervision; and resilience and the importance of progress not only for domestic but also for cross-border resolution frameworks. The IMF considered the stability implications of the structure of complex groups and throughout its policy output stressed the importance of robust, intensive supervisory practices.

In launching the regulatory reform agenda, the G20 jurisdictions committed to participation in the Financial Sector Assessment Programs (FSAPs), which previously were voluntary. The IMF adapted its FSAP process to the postcrisis era, successively in 2009 and 2014, to strengthen the analytical components to detect vulnerabilities and measure resilience through stress testing and spillover analysis, as well as the quality of financial stability policy and financial safety nets. Consequently, since the crisis, the FSAP has been able to expand coverage of its stress testing and deepen its analysis of interconnectedness and cross-border spillovers. Through both the FSAP and Article IV surveillance, the IMF has worked with country authorities to improve systemic risk monitoring, develop and calibrate macroprudential tools, and strengthen macrofinancial analysis. Countries deemed to be systemic in the IMF’s analysis have been subject to mandatory FSAP assessment on a five-year cycle. Consistent with the 2008 Washington declaration, the IMF has collaborated with the FSB in examining the impact of regulatory reform on emerging market and developing economies and continues to provide capacity-building assistance to emerging market and developing economies in their own programs to enhance their regulatory and supervisory systems.

This box was prepared by Katharine Seal.

<sup>1</sup>Declaration of the Summit on Financial Markets and the World Economy (G20 2008).

<sup>2</sup>The IMF’s intellectual contribution to central debates includes Viñals, Fiechter, and others (2010); Viñals, Pazarbasio-

glu, and others (2010); Claessens and others (2010); Claessens and others (2011); Otter-Robe and others (2011); and Ong and Pazarbasioğlu (2013).

## Box 2.2. The Data Gaps Initiative: Better Data as a Foundation for the Financial System Reform Agenda

Lack of timely and reliable data proved to be very costly during the global financial crisis because it hindered policymakers' ability to detect emerging risks and imbalances. This problem was emphasized by the IMF in March 2009 (Johnston and others 2009) and the importance of filling data gaps was widely supported by the international community. Key gaps were identified in financial sector data for detecting the buildup of risk, cross-border interconnections, financial linkages of global systemically important financial institutions, sectoral accounts, and national balance sheets. In response, in October 2009, the G20 finance ministers and central bank governors endorsed the G20 Data Gaps Initiative (DGI) to address the key data gaps identified by the crisis. The initiative is led by the Financial Stability Board Secretariat and IMF staff.

The first phase of the DGI (2009–15) aimed to better capture the buildup of risk in the financial sector, improve data on connections within the international financial network, monitor the vulnerability of domestic economies to shocks, and improve communication of official statistics. Its second phase (DGI-2), launched in September 2015, focuses on implementation of the regular collection and dissemination of reliable and timely statistics for policy use. The DGI-2 introduced action plans that set out specific targets for the implementation of its 20 recommendations by 2021. The DGI-2 also increases the emphasis on linkages across economic and financial sectors, reflecting the policy need to assess risks, interconnections, and spillovers within and across economies. It also aims to improve cooperation, communication, and sharing of data.

Among the main achievements to date are the following:

- The DGI led to the development of the IMF's Special Data Dissemination Standards (SDDS) Plus, launched in February 2012, targeting those

economies that have systemically important financial sectors.

- Most of the G20 economies now report the seven financial soundness indicators (FSIs) that are expected from adherents to the SDDS Plus,<sup>1</sup> and work is well advanced to initiate collection of FSI measures beyond simple averages (for example, median, skewness, quartiles) to provide information on tail risks, concentration, and shifts in risk distribution.
- A framework for reporting credit default swaps was developed and implemented, and new international guidance was developed for securities statistics.
- A framework for the collection and sharing of data on global systemically important banks was established and reporting of such data to the International Data Hub is progressing.
- All G20 economies report their international investment positions quarterly and core Coordinated Portfolio Investment Survey data semiannually.
- Most of the G20 economies disseminate residential property price indices.

The DGI has been a key component of the financial sector reform agenda. By contributing to a better understanding of trends and volatility of capital flows, DGI data are also related to the G20 work on international financial architecture. In turn, global regulatory reforms such as Basel III and the work on the Legal Entity Identifier support the DGI by contributing to the robustness of various data frameworks (that is, security-by-security and cross-border exposures of nonbank corporations).

Through 2021, DGI work will address key remaining data gaps: compilation of government finance statistics beyond the central government; sectoral accounts, including details on shadow banking activities; and sharing of granular data.

<sup>1</sup>These seven FSIs are: (1) regulatory Tier 1 capital to risk weighted assets; (2) regulatory Tier 1 capital to assets; (3) non-performing loans net of provisions to capital; (4) non-performing loans to total gross loans; (5) return on assets; (6) liquid assets to short-term liabilities; and (7) residential real estate prices.

This box was prepared by Florina Tanase and Evrim Bese Goksu.

### Box 2.3. Resolution Reforms in Selected Countries

Country-level Financial Sector Assessment Programs (FSAPs) conducted in recent years have highlighted substantial progress in improving bank resolution regimes and fostering resolvability of systemically important banks.

**United States.** Title II of the Dodd-Frank Act (“Orderly Liquidation Authority”) provides the U.S. authorities with an extensive range of powers to resolve systemic nonbank financial institutions. These powers are closely aligned with the powers of the Federal Deposit Insurance Corporation to resolve banks and the Financial Stability Board’s Key Attributes of Effective Resolution Regimes for Financial Institutions (Key Attributes). Substantial progress has been made with resolution planning, as illustrated by the “single point of entry” strategy that envisages the resolution of complex groups through the initiation of receivership proceedings at the holding company level, with shareholders and creditors of the failed holding company absorbing its losses. Still, the 2015 FSAP found that further improvements are needed with respect to cross-border issues, including the introduction of statutory powers to act promptly in response to actions taken by foreign resolution authorities. It also recommended enhancing the resolution regime for systemically important insurance companies and other nonbanks (such as asset managers and financial market infrastructure).

**United Kingdom.** The 2016 FSAP concluded that the United Kingdom has an effective resolution regime that is broadly in line with the Key Attributes. The Bank of England, as the resolution authority, cooperates closely with other stakeholders, both domestically and on a cross-border basis. The regime provides for a broad range of stabilization options—including bail-in—that can be used to preserve financial stability while avoiding taxpayer bailouts. Still, the FSAP recommended introducing an explicit power to depart from *pari passu* treatment of creditors where needed to preserve financial stability. The FSAP also recommended development of an effective resolution framework for insurance companies, which could be systemically important at the point of failure.

**Switzerland.** At the time of the 2014 FSAP, the Swiss authorities had already adopted a broad range of resolution powers. However, although many elements from the Key Attributes were found to be in place, the FSAP suggested some improvements, including removal of the requirement for creditor approval to apply resolution powers to banks not predesignated as systemically important; enhancing the authorities’ powers to implement bridge banks to temporarily take over and main-

tain certain assets, liabilities, and operations of a bank placed into resolution; and development of guidance for resolution and recovery planning for nonsystemic banks. Subsequent reforms—such as the introduction in federal legislation of temporary stays on early termination rights and mandatory debt write-downs during resolution—have further strengthened the regime.

**Japan.** The 2017 FSAP found that the Japanese resolution framework has been significantly enhanced in recent years. Legal reforms in 2013 introduced additional resolution options and expanded the framework to include insurance companies, securities firms, and holding companies—even though central counterparties and other financial market infrastructure are not yet covered. Still, some gaps remain, including the absence of statutory bail-in powers and an explicit safeguard that “no creditor [will be] worse off than in liquidation.” Moreover, the FSAP urged the authorities to provide further clarity regarding the circumstances under which the various components of the framework would be used because ambiguity could hamper effective implementation of powers to resolve systemically important banks without reliance on public support.

**Euro area.** The 2018 FSAP found the bank resolution framework substantially upgraded, but noted that the regime remains fragmented. The adoption of the Bank Recovery and Resolution Directive (BRRD) and the creation of the Single Resolution Mechanism (SRM) provided a comprehensive set of powers for early intervention and bank resolution, including for bailing in creditors. However, intervention cases since the new regime came into effect have demonstrated that incentives remain to use national powers with less stringent burden-sharing requirements than under the SRM/BRRD. This has resulted in different treatment of bank creditors depending on where intervention takes place. The FSAP urged the authorities to expedite the buildup of loss-absorbing capacity, strengthen the operational capacity of the resolution authority, and align triggers and minimum loss-sharing requirements, while introducing sufficient flexibility into the BRRD/SRM for times of severe financial stability risk. In addition, the FSAP recommended making the Single Resolution Fund fully operational and establishing a deposit insurance scheme for the entire euro area.

**Other FSB members.** While various other jurisdictions (including Canada, Hong Kong SAR, and Singapore) have also made considerable progress in strengthening their resolution regimes, recent FSAPs in other jurisdictions (such as China, India, Indonesia, and Turkey) have found that further efforts remain necessary to enhance legislative frameworks or buttress operational capacity.

This box was prepared by Constant Verkoren and Marc Dobler.



## References

- Adrian, Tobias. 2017. “Risk Management and Regulation.” *Journal of Risk* 20 (1): 23–57.
- Altavilla, Carlo, Marco Pagano, and Saverio Simonelli. 2016. “Bank Exposures and Sovereign Stress Transmission.” *Review of Finance* 21 (6): 2103–39.
- Arslanalp, Serkan, and Takahira Tsuda. 2014. “Tracking Global Demand for Advanced Economy Sovereign Debt.” *IMF Economic Review* 62 (3): 430–64.
- Ashcraft, Adam B., and Til Schuermann. 2008. “Understanding the Securitization of Subprime Mortgage Credit.” *Foundations and Trends in Finance* 2 (3): 191–309.
- Basel Committee on Banking Supervision (BCBS). 2010. “Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems” (revised June 2011). Bank for International Settlements, Basel.
- . 2017. “Thirteenth Progress Report on Adoption of the Basel Regulatory Framework.” Bank for International Settlements, Basel.
- Bouveret, Antoine. 2018. “Cyber Risk for the Financial Sector: A Framework for Quantitative Assessment.” IMF Working Paper 18/143, International Monetary Fund, Washington, DC.
- Claessens, Stijn, Giovanni Dell’Ariccia, Deniz Igan, and Luc Laeven. 2010. “Lessons and Policy Implications from the Global Financial Crisis.” IMF Working Paper 10/44, International Monetary Fund, Washington, DC.
- Claessens, Stijn, Ceyla Pazarbasioglu, Luc Laeven, Marc Dobler, Fabian Valencia, Oana Nedelescu, and Katharine Seal. 2011. “Crisis Management and Resolution: Early Lessons from the Financial Crisis.” IMF Staff Discussion Note 11/05, International Monetary Fund, Washington, DC.
- Cohen, Benjamin, and Gerald Edwards Jr. 2017. “The New Era of Expected Credit Loss Provisioning.” *BIS Quarterly Review* March: 39–56.
- Committee on Payment and Settlement Systems. 2010. “Strengthening Repo Clearing and Settlement Arrangements.” Bank for International Settlements, Basel, September.
- Crockett, Andrew D. 2000. “Marrying the Micro- and Macro-Prudential Dimensions of Financial Stability.” Remarks made at The Eleventh International Conference of Banking Supervisors, Basel, September 21.
- Data Gaps Initiative (DGI). Various years. *Annual Progress Reports*. Retrieved July 13, 2018, from <http://www.imf.org/external/ns/cs.aspx?id=290>.
- Dell’Ariccia, Giovanni, Caio Ferreira, Nigel Jenkinson, Luc Laeven, Alberto Martin, Camelia Minoiu, and Alex Popov. 2018. “Managing the Sovereign-Bank Nexus.” IMF Staff Discussion Note, International Monetary Fund, Washington, DC.
- Demirgüç-Kunt, Asli, and María Soledad Martínez Pería. 2010. “A Framework for Analyzing Competition in the Banking Sector: An Application to the Case of Jordan.” World Bank Policy Research Working Paper 5499, World Bank, Washington, DC.
- Financial Stability Board (FSB). 2015. “Principles on Loss-Absorbing and Recapitalisation Capacity of G-SIBs in Resolution: Total Loss-Absorbing Capacity (TLAC) Term Sheet.” Financial Stability Board, Basel. <http://www.fsb.org/2015/11/total-loss-absorbing-capacity-tlac-principles-and-term-sheet/>.
- . 2016. “Developing Effective Resolution Strategies and Plans for Systemically Important Insurers.” Financial Stability Board, Basel. <http://www.fsb.org/2016/06/developing-effective-resolution-strategies-and-plans-for-systemically-important-insurers/>.
- . 2017a. “Assessment of Shadow Banking Activities: Risks and The Adequacy of Post-Crisis Policy Tools to Address Financial Stability Concerns.” Financial Stability Board, Basel.
- . 2017b. “FinTech Credit: Market Structure, Business Models and Financial Stability Implications.” Financial Stability Board, Basel.
- . 2017c. “Guidance on Central Counterparty Resolution and Resolution Planning.” Financial Stability Board, Basel. <http://www.fsb.org/2017/07/guidance-on-central-counterparty-resolution-and-resolution-planning-2/>.
- . 2017d. “Implementing the FSB *Principles for Sound Compensation Practices* and Their *Implementation Standards*: Fifth Progress Report.” Financial Stability Board, Basel. <http://www.fsb.org/2017/07/implementing-the-fsb-principles-for-sound-compensation-practices-and-their-implementation-standards-fifth-progress-report/>.
- . 2017e. “Framework for Post-Implementation Evaluation of the Effects of the G20 Financial Regulatory Reforms.” Financial Stability Board, Basel.
- Financial Stability Board, International Monetary Fund, and Bank for International Settlements (FSB, IMF, and BIS). 2009. “Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations.” <https://www.imf.org/external/np/g20/pdf/100109.pdf>.
- Financial Stability Board, International Monetary Fund, and Bank for International Settlements. 2011. “Macroprudential Policy Tools and Frameworks Progress Report to G20.” <https://www.imf.org/external/np/g20/pdf/102711.pdf>.
- Financial Stability Board, Bank for International Settlements, and International Organization of Securities Commissions (FSB, BIS, and IOSCO). 2018. “Incentives to Centrally Clear Over-the-Counter (OTC) Derivatives: A Post-Implementation Evaluation of the Effects of the G20 Financial Regulatory Reforms.” Financial Stability Board, Basel.
- Georgoutsos, Dimitris, and George Moratis. 2017. “Bank-Sovereign Contagion in the Eurozone: A Panel VAR Approach.” *Journal of International Financial Markets, Institutions and Money* 48: 146–59.
- Group of Twenty (G20). 2008. Declaration of the Summit on Financial Markets and the World Economy, Washington,



- DC, November 15. <http://www.un.org/ga/president/63/commission/declarationG20.pdf>.
- International Monetary Fund (IMF). 2013. “Key Aspects of Macroprudential Policy.” IMF Policy Paper, International Monetary Fund, Washington, DC.
- . 2017. “Recent Trends in Correspondent Banking Relationships—Further Considerations.” IMF Executive Board Paper, International Monetary Fund, Washington, DC.
- International Monetary Fund, Financial Stability Board, and Bank for International Settlements. 2016. “Elements of Effective Macroprudential Policies: Lessons from International Experience.” Washington, DC, August 31. <https://www.imf.org/external/np/g20/pdf/2016/083116.pdf>.
- International Organization of Securities Commissions (IOSCO). 2017. “IOSCO Research Report on Financial Technologies (FinTech).” International Organization of Securities Commissions, Madrid. <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD554.pdf>.
- Johnston, R. Barry, Effie Psalida, Phil de Imus, Jeanne Gobat, Mangal Goswami, Christian Mulder, and Francisco Vazquez. 2009. “Addressing Information Gaps.” IMF Staff Position Note 09/06, International Monetary Fund, Washington, DC.
- Kopp, Emanuel, Lincoln Kaffenberger, and Christopher Wilson. 2017. “Cyber Risk, Market Failures, and Financial Stability.” IMF Working Paper 17/185, International Monetary Fund, Washington, DC.
- Leon, Florian. 2014. “Measuring Competition in Banking: A Critical Review of Methods.” Working Paper 201412, Centre d’Etudes et de Recherches sur le Développement International (CERDI), University of Auvergne, Auvergne, France.
- Ong, Li L., and Ceyla Pazarbasioglu. 2013. “Credibility and Crisis Stress Testing.” IMF Working Paper 13/178, International Monetary Fund, Washington, DC.
- Otker-Robe, Inci, Aditya Narain, Anna Ilyina, Jay Surti, Alberto Buffa di Perrero, Julian Chow, Marc Dobler, Silvia Iorgova, Turgut Kisinbay, Michael Moore, Jiri Podpiera, Katharine Seal, Volodymyr Tulin, and Jianping Zhao. 2011. *The Too-Important to Fail Conundrum: Impossible to Ignore and Difficult to Resolve*. IMF Staff Discussion Note 11/12, International Monetary Fund, Washington, DC.
- Reinhart, Carmen M., and Kenneth S. Rogoff. 2009. *This Time Is Different. Eight Centuries of Financial Folly*. Princeton University Press.
- Viñals, José, Jonathan Fiechter, Aditya Narain, Jennifer A. Elliot, Ian Tower, Pierluigi Bologna, and Michael Hsu. 2010. “The Making of Good Supervision: Learning to Say ‘No.’” IMF Staff Position Note 2010/08, International Monetary Fund, Washington, DC.
- Viñals, José, Ceyla Pazarbasioglu, Laura E. Kodres, Aditya Narain, and Marina Moretti. 2010. “Shaping the New Financial System: Progress and Next Steps.” IMF Staff Position Note 2010/15, International Monetary Fund, Washington, DC.
- Wendt, Froukelien. 2015. “Central Counterparties: Addressing Their Too Important to Fail Nature.” IMF Working Paper 15/21, International Monetary Fund, Washington DC.

