Committee on the Global Financial System

CGFS Papers
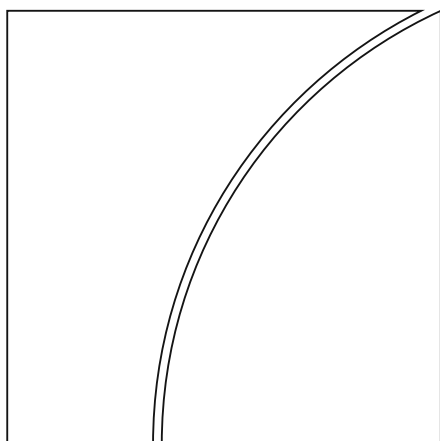
No 60

Structural changes in banking after the crisis

BANK FOR INTERNATIONAL SETTLEMENTS

This publication is available on the BIS website (www.bis.org).

Preface

The experience of the global financial crisis, the post-crisis market environment and changes to regulatory frameworks have had a marked impact on the banking sector globally. In response to their new operating landscape, banks have been re-assessing and adjusting their business strategies and models. At the same time, a number of advanced economy banking systems have to confront low profitability and legacy problems.

Against this background, the Committee on the Global Financial System (CGFS) mandated a Working Group chaired by Claudia Buch (Deutsche Bundesbank) and B Gerard Dages (Federal Reserve Bank of New York) to examine trends in bank business models, performance and market structure over the past decade, and assess their implications for the stability and efficiency of banking markets.

The following report presents the Group's conclusions on structural changes in the banking sector after the crisis. The first message is that while many large advanced economy banks have moved away from trading and cross-border activities, there does not appear to be clear evidence of a systemic retrenchment from core credit provision. Second, bank profitability has declined across countries, and individual banks have experienced persistently weak earnings and poor investor sentiment, suggesting a need for further cost cutting and structural adjustments. Supervisors and authorities should monitor banks' adjustment, assessing any risks that may emerge, but also play a role in facilitating the process by removing impediments where necessary. Third, in line with the intended direction of the regulatory reforms, banks have significantly enhanced their balance sheet and funding resilience and curbed their involvement in certain complex activities. Nonetheless, market participants and authorities should not become complacent about the progress to date and press on with the implementation of reform.

The adaption of the banking sector to the post-crisis operating landscape warrants ongoing close attention. I hope that this work provides a useful resource by documenting the state of ongoing structural change in banking, and providing a starting point for further in-depth analysis.

William C Dudley

Chair, Committee on the Global Financial System
President, Federal Reserve Bank of New York

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Executive summary

The decade since the onset of the global financial crisis has brought about significant structural changes in the banking sector. The crisis revealed substantial weaknesses in the banking system and the prudential framework, leading to excessive lending and risk-taking unsupported by adequate capital and liquidity buffers. The effects of the crisis have weighed heavily on economic growth, financial stability and bank performance in many jurisdictions, although the headwinds have begun to subside. Technological change, increased non-bank competition and shifts in globalisation are still broader environmental challenges facing the banking system.

Regulators have responded to the crisis by reforming the global prudential framework and enhancing supervision. The key goals of these reforms have been to increase banks' resilience through stronger capital and liquidity buffers, and reduce implicit public subsidies and the impact of bank failures on the economy and taxpayers through enhanced recovery and resolution regimes. At the same time, the dynamic adaptation of the system and the emergence of new risks warrant ongoing attention.

In adapting to their new operating landscape, banks have been re-assessing and adjusting their business strategies and models, including their balance sheet structure, cost base, scope of activities and geographic presence. Some changes have been substantial and are ongoing, while a number of advanced economy banking systems are also confronted with low profitability and legacy problems.

This report by the CGFS Working Group examines trends in bank business models, performance and market structure, and assesses their implications for the stability and efficiency of banking markets.

The main findings on the **evolution of banking sectors** are as follows:

Changes in banking market capacity and structure. The crisis ended a period of strong growth in banking sector assets in many advanced economies. Several capacity metrics point to a shrinking of banking sectors relative to economic activity in several countries directly impacted by the crisis. This adjustment has occurred mainly through a reduction in business volumes rather than the exit of firms from the market. Banking sectors have expanded in countries that were less affected by the crisis, particularly the large emerging market economies (EMEs). Concentration in banking systems has tended to increase, with some exceptions.

Shifts in bank business models. Advanced economy banks have tended to re-orient their business away from trading and more complex activities, towards less capital-intensive activities, including commercial banking. This pattern is evident in the changes in banks' asset portfolios, revenue mix and increased reliance on customer deposit funding. Large European and US banks have also become more selective and focused in their international banking activities, while banks from the large EMEs and countries less affected by the crisis have expanded internationally.

Trends in bank performance. Bank profitability (return on equity) has declined across countries and business model types from the historically high rates seen before the crisis. At least in part, this reflects lower leverage induced by the regulatory reforms. In addition, many advanced economy banks, in particular banks in some European countries, are facing sluggish revenues and an overall cost base that has

been resistant to cuts, including, in some cases, legacy costs associated with past investment decisions and misconduct.

The main findings regarding the impact of post-crisis structural change for the **stability of the banking sector** are related to three areas:

Bank resilience and risk-taking. Banks globally have enhanced their resilience to future risks by substantially building up capital and liquidity buffers. The increased use of stress testing by banks and supervisors since the crisis also provides for greater resilience on a forward-looking basis, which should help support credit flows in good and bad times. In addition, advanced economy banks have shifted to more stable funding sources and invested in safer and less complex assets. Some of these adjustments may be driven partly by cyclical factors, such as accommodative monetary policy, and hence may diminish as conditions change. Qualitative evidence indicates that banks have considerably strengthened their risk management and internal control practices. Although these changes are hard to assess, supervisors point to significant scope for further improvements, in particular because of the inherent uncertainties about the future evolution of risks.

Market sentiment and future bank profitability. Despite a recovery in market-based indicators of investor sentiment towards larger institutions in recent years, equity investors remain sceptical towards some banks with low profitability. Simulation analysis carried out by the Working Group suggests that some institutions need to implement further cost-cutting and structural adjustments.

System-wide effects. Assessing the impact of structural change on system-wide stability is harder than in the case of individual banks because of complex interactions within the system. Nonetheless, a number of changes are consistent with the objectives of public authorities and the reform process. First, banks appear to have become more focused geographically in their international strategy and tend to intermediate more of their international claims locally. Second, direct connections between banks through lending and derivatives exposures have declined. Third, some European banking systems with relatively high capacity have made progress with consolidation. Fourth, while the effect of less business model diversity arising from the repositioning of many banks towards commercial banking cannot be assessed yet, this trend has been accompanied by a shift towards more stable funding sources (such as deposits). A range of other reforms has also enhanced systemic stability (eg money market mutual fund reforms) and further progress has been made on resolution and recovery frameworks.

Changes in banking sector resilience have to be measured against the impact on the services provided by the sector. The main findings regarding the impact of changes on the **efficiency of financial intermediation services** are:

Provision of bank lending to the real economy. Trends in bank-intermediated credit have been uneven over time and across countries, reflecting differences in their crisis experience and related overhang of credit. Credit declined significantly relative to economic activity in advanced economies that bore the brunt of the crisis, and in most countries started to recover only from 2015. But the adjustment is still ongoing in others, reflecting in part a legacy of problem bank assets that continues to hamper the growth of fresh loans. By comparison, advanced economy banking systems not significantly affected by the crisis continued to report solid loan growth, notwithstanding tighter regulations.

Recognising the difficulty of disentangling demand and supply drivers, the evidence gathered by the group does not suggest a systematic change in the willingness of banks to lend. But, in line with the objectives of regulatory reform, lenders have become more risk-sensitive and more discriminating across borrowers. In contrast to many advanced economies, bank lending has expanded strongly in EMEs, raising sustainability concerns and prompting the use of macroprudential measures and the tightening of certain lending standards more recently.

Capital market activities. Crisis-era losses combined with regulatory changes have motivated a significant reduction in risk and scale in the non-equity trading and market-making businesses of a number of global banks.

International banking was one of the areas most affected by the crisis. Aggregate foreign bank claims have seen a significant decline since the crisis, driven particularly by banks from the advanced economies most affected by the crisis, especially from some European countries. By contrast, banks from other non-crisis countries have expanded their foreign activities, in some cases quite substantially, resulting in a significant change in the country composition of global banking assets.

The report highlights four **key messages for markets and policymakers**:

1. **Post-crisis, a stronger banking sector has resumed the supply of intermediation services to the real economy, albeit with some changes in the balance of activities.**

   – Bank credit growth remains below its excessive pre-crisis pace in advanced economies but without indications of a systematic reduction in the supply of local credit. Lending to some sectors and borrowers has seen reductions, however, as banks have adjusted their risk profile, and policymakers should remain attentive to potential unintended gaps in the flow of credit.

   – Experience from crisis countries underscores the benefits of acting early in addressing problems associated with non-performing loans (NPLs).

   – The withdrawal of some banks from capital markets-related business has coincided with signs of fragile liquidity in some markets, although causality remains an open question.

2. **Longer-term profitability challenges require the attention of banks and supervisors, as they may signal risk-taking incentives and overcapacity.** Low profitability partly reflects cyclical factors but also higher capitalisation and more resilient bank balance sheets. As such, banks and their investors need to adapt to a "new normal". Market concerns about low profitability may deprive banks of an important source of fresh capital, or encourage risk-taking and leverage by banks, thus placing a premium on robust risk management, regulation and supervision. In some cases, low profitability might also signal the existence of excess capacity and structural impediments to exit for individual banks, requiring decisive policy action to apply relevant rules.

3. **Consolidation and preservation of gains in bank resilience requires ongoing surveillance, risk management and a systemic perspective.** Key indicators show areas of improvement since the crisis, but also areas which are still a work in progress. Authorities and market participants should not become complacent. The system is adapting to a variety of changes, the interaction of which is difficult to predict. Authorities should monitor the ongoing adaptation and evolution in the nature and locus of risk-taking within the banking sector and the financial

system more broadly. In this regard, the group sees scope for the international supervisory community to undertake a post-crisis study of bank risk management practices. In addition, ample buffers remain critical to coping with unexpected losses from new risks.

4. **Better use and sharing of data are critical to enhanced surveillance of systemic risk.** Surveillance is crucial, given that the financial sector evolves dynamically and because future risks will likely differ from past ones. Although data availability has improved, there is a need to make better use of existing data to assess banking sector structural adjustment and related risks. This effort will likely require additional conceptual work, building on the data sets of national authorities and the international financial institutions. Areas that warrant further analysis include the potential for increased similarities in the exposure profile of banks to correlated shocks, the growing role and implications of fintech, and the migration of activity and risk to the non-bank sector.

1. Introduction

The financial crisis of 2007–09 was a watershed for the banking sector globally. It revealed a pattern of excessive risk-taking and inadequate capital and liquidity buffers within the industry, together with shortcomings in the prudential framework. Regulators have responded with more demanding capital and liquidity standards, stronger supervision, and more explicit resolution frameworks. The operating landscape for banks has also changed markedly, reflecting a prolonged period of private sector deleveraging, weak economic growth and historically low interest rates in most advanced economies, accompanied by shifts in the globalisation trends of the real economy. Stakeholder scrutiny of banks has intensified, while technology has empowered new non-bank, challengers to banks' businesses, thus adding to competitive pressure. Many of these trends are ongoing and evolving.

Banks have been responding to the experience of the crisis and the post-crisis operating environment. Globally, banks have been re-assessing and adjusting their business strategies, including their growth plans, balance sheet positions, cost bases, organisational structures, scope of activities and geographic presence. Adjustments have also affected less visible aspects of their business, including governance and risk management practices.

In light of the substantial changes in banking over the past decade, the Committee on the Global Financial System (CGFS) established a Working Group to examine trends in bank business models, performance and market structure, and assess their implications for the stability and efficiency of banking markets. The Group was also tasked with considering the drivers of trends in banking and the extent to which the changes observed may be temporary or long-lasting.

Assessing the implications of post-crisis changes for the stability and efficiency of banking required a focus on system-wide developments in addition to those for individual institutions. For the purposes of its study, the Group considered the stability of the banking sector as its ability to remain resilient and continue to provide credit and other core intermediation services to the economy during periods of stress. The efficiency of the banking sector was considered from the perspective of its provision of lending and capital market services in support of growth in the real economy.

This report presents the Group's findings, which are based on analyses of firm- and country-level data, ongoing work at central banks and reviews of relevant banking literature. The Group also sought out the perspectives of academics and private sector bank analysts and reached out to bank supervisors in member countries to get their views on post-crisis developments in banks' risk management practices.[1]

The report comprises six chapters. Chapter 2 provides an overview of the post-crisis operating environment. Chapter 3 presents the key trends in market structure, business models and the performance of banks. Chapters 4 and 5 analyse the implications of these trends for the stability and efficiency of the banking sector. Issues for policymakers, including areas that warrant attention, are discussed in Chapter 6. The report also includes a set of annex tables with time series of system-level banking data.

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[1]　The Group thanks Thorsten Beck, Michael Koetter and Luc Laeven for their feedback on selected parts of this report.

2. An overview of banks' operating environment

This chapter provides context on the conditions under which the banking sector has evolved, including the experience of banks during the financial crisis and post-crisis changes in banks' operating environment, including key macro-financial, regulatory and competitive developments.

2.1 Background on banks' experience in the financial crisis

The period preceding the financial crisis was one of considerable exuberance, primarily in the banking sectors of many advanced economies. Banking system assets, credit and profits grew at a much faster pace than economic activity. Risk was often neglected in compensation and other incentive structures – which heavily rewarded short-term gains over long-term sustainable returns – and not properly assessed in bank strategies. Credit standards were relaxed, and many banks relied on short-term wholesale markets to fund activities. The inherent procyclicality of the financial system also helped fuel credit and economic growth in mutually reinforcing ways. Banks in some countries operated with relatively thin capital and liquidity buffers. The cross-border business of large banks expanded sharply, as did revenue generation from complex and opaque activities, including structured securitisations and over-the-counter (OTC) derivatives.

Although pre-crisis developments in the banking sector were at the heart of the crisis, other factors contributed, including misaligned incentives in the securitisation process and in the implicit government support of banks, inadequate bank regulation and supervision in many countries, a lack of risk discrimination in credit markets and increased leverage in some parts the non-financial sector.[2]

The crisis was triggered around mid-2007 by the deflation of the US housing boom, resulting in sizeable reported losses on US structured mortgage credit and uncertainty about the extent of institutions' exposures to these assets. The tightening of financial conditions over ensuing months exposed the much broader pattern of excessive risk-taking, maturity transformation and acute vulnerability within the global banking industry. As some banks (and other financial intermediaries) came under liquidity strain, central banks significantly expanded their liquidity facilities. The closure of bank funding markets after the Lehman Brothers failure in September 2008 prompted governments to guarantee banks' wholesale funding. Numerous banks in Europe and the United States failed or received government capital injections, and some were nationalised. Asset disposal schemes were set up in some countries to help banks address their problem assets. These efforts succeeded in preventing a collapse of the financial system and the economy. But the resultant fiscal costs from direct banking sector financial support, output losses and increases in public debt were very substantial, in some cases raising concerns about the solvency of sovereigns.[3]

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[2] Since our focus is developments in the banking sector, this list is not intended to be exhaustive but rather illustrate that other factors were involved.

[3] See Laeven and Valencia (2012) for quantification of these costs.

The crisis affected all the large banking systems, although the impact varied because of different starting cyclical conditions and structural vulnerabilities (Graph 1). While banks in the euro area, the United Kingdom and the United States suffered large losses at the height of the crisis, those in Australia, Canada and Sweden fared better and did not need government capital support. EME banks were more insulated from the turmoil given their domestic focus, relatively low use of market funding and generally higher regulatory buffers, the latter reflecting in part lessons of prior financial crises.

Policy responses to the crisis also contributed to the heterogeneity of outcomes. For example, the process of bank balance sheet repair and recapitalisation in the United States ran ahead of that in some European countries.

Another important reason for regional variation in bank outcomes over the past decade is the impact of the euro area sovereign debt crisis that began around late 2010. To a degree, fears about sovereign creditworthiness were an extension of banking sector problems that emerged in the 2007–09 financial crisis, such as in the case of Ireland. However, for many euro area banks, the escalation of sovereign debt concerns represented an additional adverse shock that dragged on their post-crisis performance and deepened pressures for structural change.

Bank share prices and CDS spreads   Graph 1

Bank share prices

1 Jan 2007 = 100

Credit default swap premia[1]

Basis points

Australia   Sweden   Euro area   EMEs   Euro area   United States
Canada   United States   United Kingdom   United Kingdom
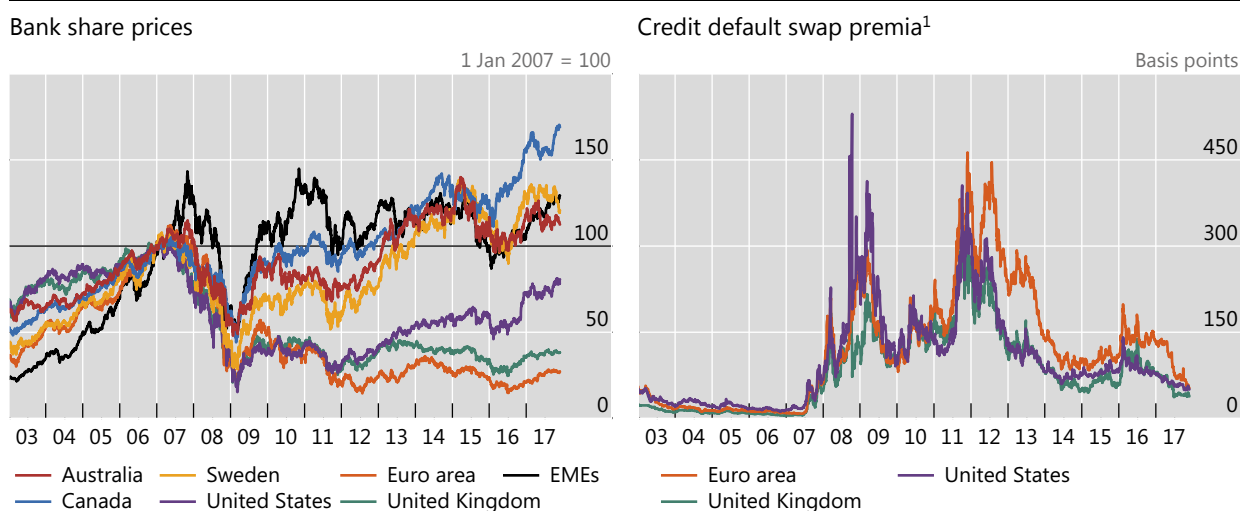
[1] Five-year on–the-run CDS spreads; simple averages over sample of banks.

Sources: Datastream; Markit.

2.2 The post-crisis operating environment for banks

The macro-financial environment. The post-crisis macroeconomic environment has been characterised by a prolonged period of weak economic growth and low inflation in the large advanced economies.[4] Prolonged private sector deleveraging has weighed on aggregate investment and credit growth (Graph 2, left-hand panel). Benchmark

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[4]   As documented in the literature, financial crises are typically associated with subsequent slower medium-term growth. For example, see Abiad et al (2009) and Reinhart and Reinhart (2015).

nominal interest rates have been at historic lows, in some cases even reaching negative territory as central banks have resorted to highly expansionary conventional and unconventional monetary policies, including considerable expansion of their balance sheets and/or negative policy rates (Graph 2, right-hand panel). Interest rates may have also been depressed by a confluence of structural factors.[5]

In contrast, private sector credit has continued to expand in EMEs, despite slower economic growth over recent years in the case of the large EMEs (Graph 2, centre panel). In China, corporate indebtedness has risen appreciably since the onset of the crisis. In some smaller EMEs and other countries that fared better in the crisis (eg Australia, Canada and Sweden), housing credit has also grown at a firm pace over the post-crisis period in association with strong rises in housing prices.

Economic growth, credit and interest rates

In per cent   Graph 2

GDP

- World
- Advanced economies
- EMEs

Total credit-to-GDP ratio[1]

- Advanced economies (non-crisis)
- Advanced economies (crisis)
- EMEs excluding China
- China

Two-year government bond yields

- United States
- United Kingdom
- Japan
- Germany
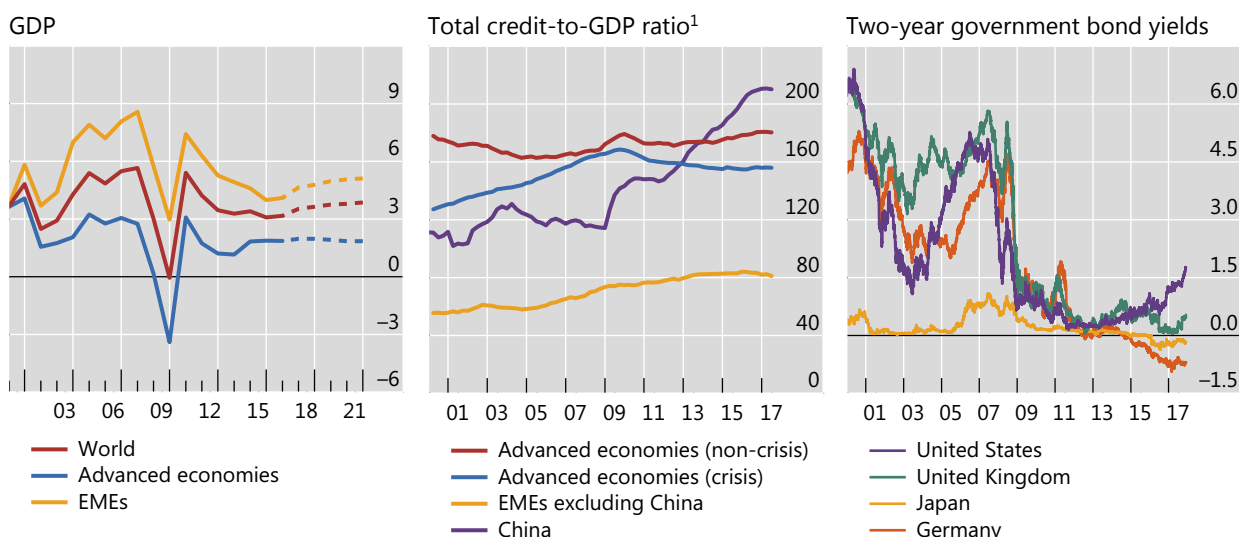
[1] For the private non-financial sector. Advanced economy crisis classifications are based on Laeven and Valencia (2012), see Graph 26. EMEs include Brazil, Hong Kong SAR, India, Korea, Mexico and Singapore. Aggregates constructed based on rolling GDP PPP weights.

Sources: IMF, *World Economic Outlook*; Bloomberg; BIS.

Regulation and supervision. Reforms to the global regulatory framework seek to strengthen bank resilience to adverse shocks through increased requirements for higher-quality capital and liquidity; address risks posed by systemically important financial institutions and reduce implicit public subsidies; and enable the effective resolution of banks. These measures are intended to reduce the probability of default for large internationally active banks to a low level, and significantly improve the system's capacity to absorb the failure of a large institution. In doing so, the reforms go beyond enhancing the soundness of individual banks and encompass a macroprudential or system-wide perspective of risks to financial stability (that is, systemic risk).[6] Some aspects of the reforms have already been implemented, while

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[5]   For a discussion, see Cunliffe (2016).

[6]   A useful definition of systemic risk is provided by the ECB (2017a): "Systemic risk can be best described as the risk that the provision of necessary financial products and services by the financial system will be impaired to the point where economic growth and welfare may be materially affected."

others are subject to transitional arrangements or are due to be introduced in coming years. Key elements of the bank regulatory changes are noted below.

- An increase in the **quantity and quality of capital** through stricter risk-weighted requirements. A non-risk-weighted ratio has been introduced as a supplementary measure to constrain leverage and reduce model risk. Authorities can activate a macroprudential countercyclical capital buffer for all banks in a jurisdiction as risks build over the credit cycle and thus reduce procyclicality.

- New **measures for globally systemically important banks** (G-SIBs) – currently a universe of 30 banks (see Annex 2) representing more than one third of global banking assets – including higher capital buffers and additional requirements for large exposures and disclosure.[7] Many countries have also introduced tougher capital and other rules for banks deemed systemically important for their domestic economy, including stress-testing requirements.

- International **prudential regulation of liquidity risk** has been introduced, with the centrepiece being two quantitative instruments – the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NFSR). The former promotes the short-term resilience of banks' liquidity profiles, while the latter aims to ensure that banks maintain a stable funding structure for their assets and off-balance sheet activities.

- A global framework for the **recovery and resolution of banks** has been established. Specifically, G-SIBs will need sufficient total loss-absorbing capacity (TLAC), including a proportion of debt that can be "bailed in" in the event of failure. Many countries are revising their national resolution regimes to allow more orderly resolution of their banks, including changes to legislation and the requirement for banks to have plans for their recovery and wind down.[8]

In some jurisdictions, international regulatory changes have been complemented by national initiatives. Most notable are measures to address the structure of banks' activities and operations, such as limits on proprietary trading and the new Intermediate Holding Company rules in the United States, and the ring-fencing of trading books from other banking activities in the United Kingdom. Some countries have also placed limits on bank remuneration. Given the importance of domestic institutional settings and the domestic costs of financial crises, macroprudential policy remains largely a national policy task, while being coordinated internationally where appropriate.

The global regulatory reforms also encompass elements outside banking. Monitoring and policy frameworks have been established for systemically important non-bank financial institutions. They have also been established for market-based finance, to ensure that bank-like risks outside the regular banking system are subject to appropriate oversight and regulation, including, for example, measures to reduce money market funds' susceptibility to runs. Other changes in most jurisdictions have included the mandatory clearing of certain standardised OTC derivatives with central counterparties, the introduction of capital charges on these exposures and surcharges for positions cleared bilaterally with other banks.

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[7] This is a rough share of G-SIB assets in global banking assets sourced from IMF (2017).

[8] However, substantial work remains to do in achieving effective resolution regimes and operationalising plans for systemically important banks (FSB (2017a)).

Stricter regulation of banks in response to the crisis has been accompanied by more intensive bank supervision, particularly for systemically important banks. This adjustment has had myriad aspects, including greater engagement between supervisors and bank boards and senior managers, wider and more stringent use of supervisory stress tests, increased risk data requirements, more targeted (or thematic) risk reviews, and greater attention placed on bank risk culture and crisis preparedness.

Governments have also exercised greater influence over banks in their role as legacy shareholders from the crisis (such as by requiring specific changes to strategies and operations). In addition, there have been sizeable regulatory fines for misconduct at some banks in the lead-up to the crisis and subsequently.

Stakeholder scrutiny. Banks have also faced increased pressure from the investor community, reflecting the ongoing weak performance of many banks as well as shifts in investor risk attitudes and perceptions. (These issues are explored further in Section 4.3 below.) This process has affected banks' funding costs and incentivised changes to their business models – for example, rating agencies are far more focused on the extent of deposit funding. More generally, regulatory authorities and the broader public have demanded an improvement in banks' corporate culture, remuneration practices and treatment of customers.

Development of the non-bank sector. Non-bank finance and non-bank financial institutions have gained a greater role in financing economic activity in the aftermath of the crisis. Corporate debt financing has increasingly shifted to capital markets in advanced economies, with bond issuance picking up noticeably (Graph 3, left-hand panel). The global assets of both insurance and pension funds and "other financial intermediaries" (OFIs) (including managed funds and non-prudentially regulated financial institutions) have also expanded relatively strongly (Graph 3, centre panel). The OFI sectors' share of total financial institution assets has risen in most European countries, as well as in some countries where the banking sector fared much better during the crisis (eg China, Korea and Mexico). Nonetheless, OFIs' share of lending in total financial institution lending is not as large as their corresponding share of total assets, and they continue to represent only a small share of global lending activity (Graph 3, right-hand panel). There are, however, clear exceptions in some countries and markets.[9]

Technological change. As banking is an information-intensive industry, innovations in information technology can have an important influence on the nature of banking services and the structure of banks. Rapid advances in computing, internet and mobile capabilities have underpinned a deeper digitalisation of banking services over recent years. Nascent but growing fintech companies have emerged that provide specialised financial services using a range of digital innovations, including those that supply credit to the household and business sector through online platforms.[10] The

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[9] For example, insurers and pension funds have rapidly increased their share of the mortgage market in the Netherlands, accounting for 20% of originations in the first half of 2016 (Netherlands Bank (2016)). Similarly, non-banks in the United States now account for a substantial share of mortgage origination volume, representing 55% of originations among the top lenders in 2016 (based on data from *Inside Mortgage Finance*).

[10] To date, fintech companies have not garnered a material share of aggregate credit (CGFS-FSB (2017)).

role of technology in finance is also being assisted by certain public initiatives.[11] Depending on banks' reaction function and their capability to adapt their business models, fintech innovations could be a competitive threat to some banks or bank business lines, or they may provide banks with an opportunity to improve customer experience or significantly lower their fixed cost base over the longer term. Technological innovations might also allow banks to improve their data analytics and compliance risk processes, yet they present new and challenging operational complexities – including cyber and data security risks – that banks will need to effectively manage.[12]

Non-bank finance and financial institutions

Graph 3

Non-financial corporations' credit[1] — Per cent of GDP
Ratio of banks to other financial institutions[2] — Ratio
Lending assets as a share of GDP[3] — Per cent of GDP

Legend: Debt securities | Loans
● 2007 | 2015
Insurance corporations and pension funds | OFIs | Banks
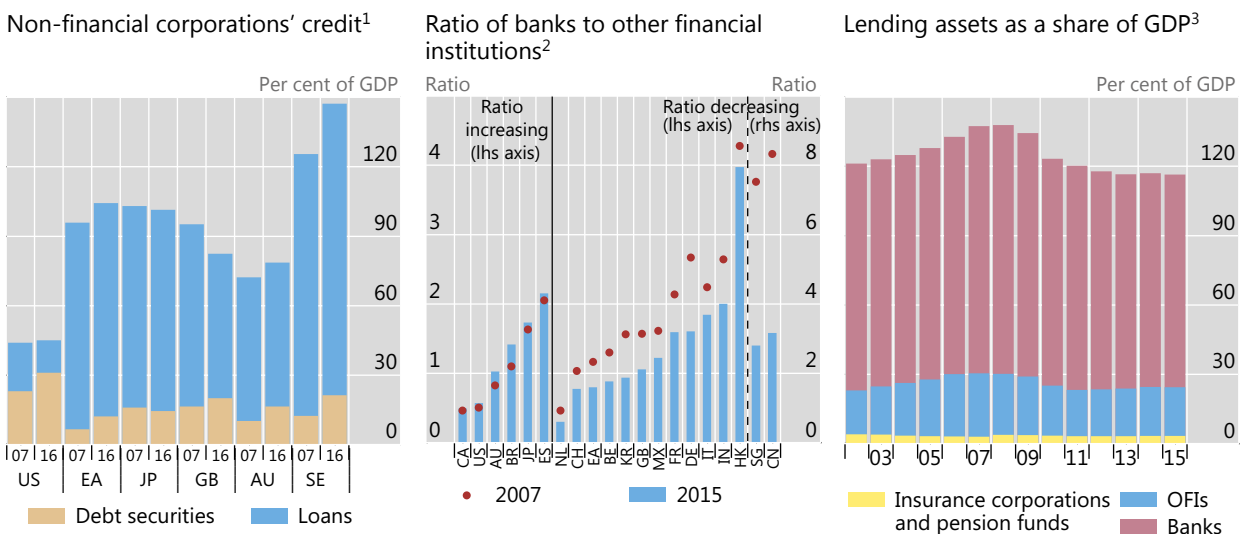
[1] For country codes, refer to Graph 4; end-year observations.   [2] Based on total financial assets; banks including public financial institutions but excluding central banks; for country codes, refer to Graph 4.   [3] For the 21 jurisdictions and the euro area covered by the FSB *Global Shadow Banking Monitoring Report 2016*.

Sources: Datastream; Financial Stability Board; national data; BIS.

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3. Key trends in banking structure and performance

This chapter provides an overview of key trends in banking since the crisis. It identifies common developments across countries, as well as similarities within smaller groups of countries or types of banks that are a significant element of the overall picture. The material provides the foundation for more targeted analysis of the key changes and their implications in subsequent chapters.

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[11] For example, regulatory sandboxes, hubs or accelerators in several countries (FSB (2017b)). In the EU, the revised Payment Services Directive (PSD2) aims to boost competition in the payments industry.

[12] This report provides a brief discussion of technological change and fintech innovations as environmental factors affecting banks over recent years, but does not seek to assess the implications of fintech competitors on banks nor banks' use of fintech innovations.

The chapter comprises six sections. The first section covers trends in asset size and resource capacity of domestic banking systems across CGFS jurisdictions.[13] Broad changes in system concentration are then discussed. The third section assesses shifts in bank business models and strategies, including asset composition, funding sources and capital buffers. The fourth section focuses on changes in the international profile of banking sectors, and the fifth section on the profitability of banks. The final section concludes with a summary of key changes.

3.1 Banking system size

The crisis brought about the end of a period of fast – and in some instances excessive – growth for many domestic banking sectors. Between 2003 and 2007, the median annual average growth of CGFS member banking systems was about 12%, compared with 4% from 2008 onwards. In some European banking systems, the ratio of bank assets to GDP has fallen considerably since the crisis, whereas it has risen in other jurisdictions (Graph 4 and Annex Table 1.1). Banking system growth in EMEs has been less affected by the crisis and most systems have continued to grow at robust rates. Of particular note has been the dramatic expansion of the Chinese banking system, which grew from about 230% to 310% of GDP over 2010–16 to become the largest in the world, accounting for 27% of aggregate bank assets across CGFS member countries, up from about 13% in 2010 (Graph 5, left-hand panel and Annex Table 1.2).

Banking system assets to GDP[1]

In per cent   Graph 4
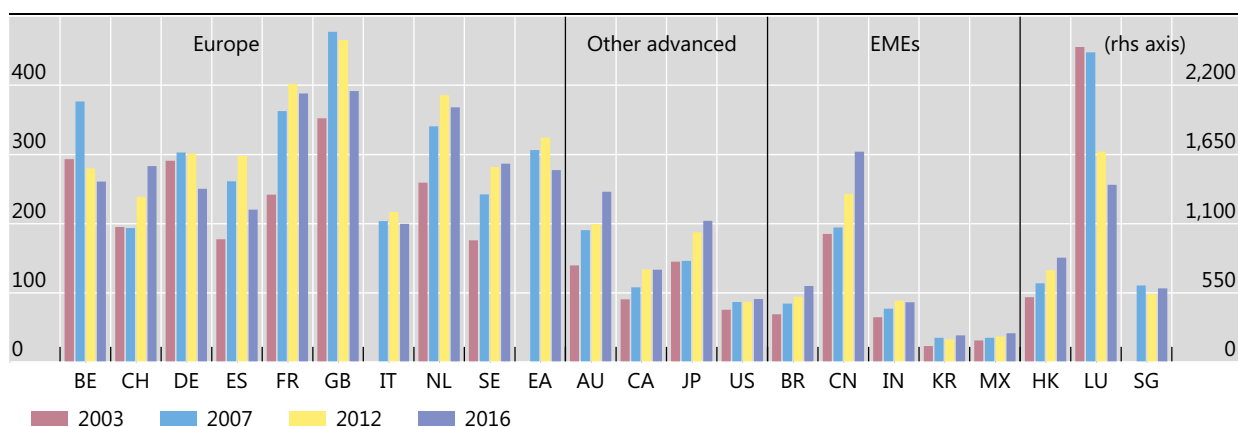
AU = Australia; BE = Belgium; BR = Brazil; CA= Canada; CH = Switzerland; CN = China; DE = Germany; EA = euro area; ES = Spain; FR = France; GB = United Kingdom; HK = Hong Kong SAR; IN = India; IT = Italy; JP = Japan; KR = Korea; LU = Luxembourg; MX = Mexico; NL = Netherlands; SE = Sweden; SG = Singapore; US = United States.

[1] Banking system assets are on a domestic or resident basis, except for China and Korea, which are on a consolidated basis.

Source: National data.

Slower banking system growth, together with increased competition from other intermediation channels, has seen the banking system's share of total financial institution assets decline in a range of countries (see Chapter 2 and Annex Table 1.3).

[13]   See Annex 1 for the list of CGFS member jurisdictions.

In addition to balance sheet size, other metrics of capacity point to a shift in the growth rate of banking sectors. The size of branch networks and the number of employees have declined after the crisis in several European countries, a trend more pronounced in systems that had high capacity relative to their population (eg Italy, Spain) (Annex Tables 1.4 and 1.5). In contrast, reflecting ongoing financial deepening, the number of branches and employees have both risen in several EMEs (China, India, Mexico), although they remain below those for most advanced economies when compared with population.

3.2 Banking system concentration

Adjustment to the post-crisis environment has taken place not only through changes in the scale of activities – the intensive margin – but also through the entry and exit of banks – the extensive margin. The number of banks has fallen in most countries over the past decade (Annex Table 1.6 and 1.7). In some cases, this appears to be a continuation of a consolidation process that was previously underway (eg in the euro area, Sweden, Switzerland and the United States).

Post-crisis reductions in bank numbers have been mainly among smaller institutions, aside from a handful of distressed large banks in the euro area and the retreat of some international banks from specific foreign markets. Reflecting relatively little consolidation activity among the largest institutions, the value of bank merger and acquisition (M&A) transactions in some large advanced economies has been subdued compared with earlier periods (Graph 5, centre panel). In the euro area, the post-crisis decline in bank M&A has been more pronounced for cross-border deals than domestic deals.[14] This trend may suggest that banks have re-directed their attention towards home markets and/or lifted their "hurdle rate" for cross-border deals in particular.

Post-crisis patterns in concentration point to greater banking system consolidation in the large advanced economies than suggested by the M&A data. Concentration ratios – measured as the share of banking system assets held by the largest five banks – have increased within the euro area and the United States, where bank consolidation was partly a consequence of dealing with the effects of the crisis (Graph 5, right-hand panel and Annex Table 1.9).[15] Yet concentration has also risen in some countries that were less affected by the crisis and where bank numbers have continued to expand or remained steady (Australia, Brazil, Singapore). In contrast, there has been a decline in concentration in several economies (Belgium, China, India and Mexico). Overall, concentration in banking systems has tended to increase since the crisis, with some clear exceptions. Nonetheless, the median concentration ratio across countries is unchanged, and there has been little change in the dispersion of concentration ratios across countries. Box A provides a case study on the Spanish banking system, which has undergone substantial consolidation since the crisis.

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[14] See ECB (2017b).

[15] Similar results can be seen when the concentration measure is based on the three largest banks (Annex Table 1.8).

Share of banking system assets across CGFS membership

Bank M&A – value of transactions

Banking system concentration, share of system assets of 5 largest banks[3]

Per cent

USD bn

Other advanced[1]　　Europe
Other EMEs[2]　　China
United States

Euro area:
United States　　Domestic
　　　　　　　　　Cross-border
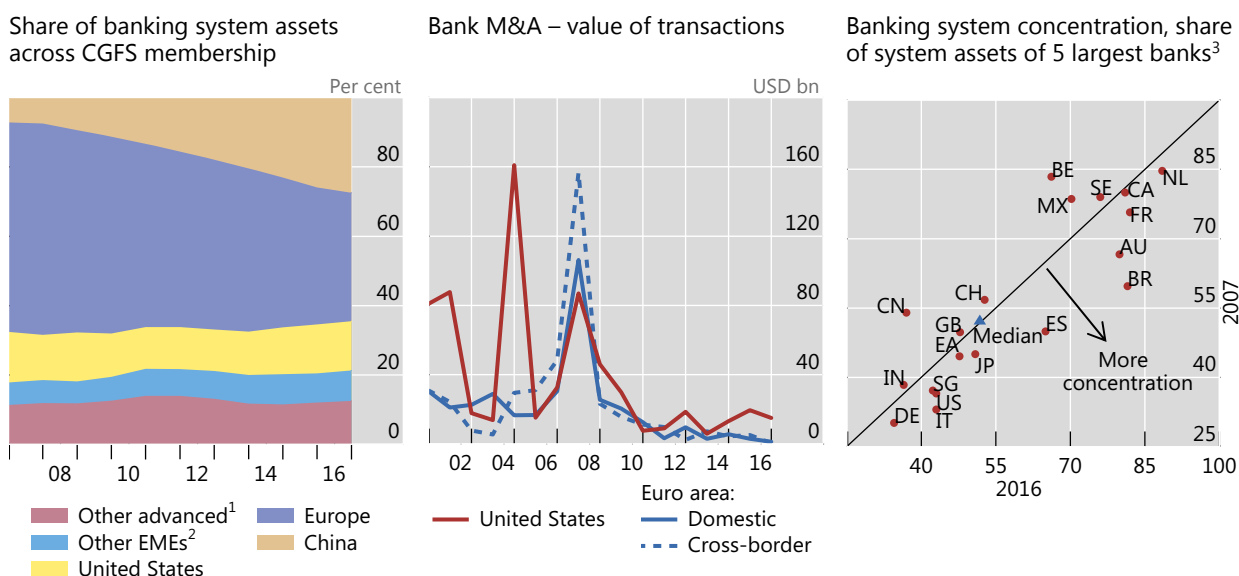
[1] Australia, Canada and Japan.　　[2] Brazil, Hong Kong SAR, India, Korea, Mexico and Singapore.　　[3] For country codes, refer to Graph 4. Median value may not reflect individual country data as shown in the graph because of the use of some confidential series.

Sources: Dealogic; national data.

3.3 Bank business models

The post-crisis period has seen a significant change in the strategic orientation of many banking firms. Broadly speaking, banks have reassessed their earlier ventures into trading activities as well as a growing dependence on wholesale sources of funding, in association with stricter capital and liquidity regulation. Use of deposit funding has increased, while businesses have tended to be repositioned towards less complex and less capital-intensive activities, including retail banking and, in some cases, wealth management. These patterns have been evident in the strategic changes implemented by many banks, and in their balance sheet compositions and revenue mix. There has also been a re-focus on home market business or core foreign markets, which is explored separately in Section 3.4 below.

It is worth emphasising that these broad observed changes to bank business models are far from fully consistent across the global banking sector. While many banks have significantly adjusted their business models in the general direction outlined above, some have been able to broadly maintain their profile and activities (in part reflecting lower pressure for change), while others have even "swum a little against the tide".[16] From a geographic perspective, adjustments have generally been more profound for the most globally active banks and large European banks, and less significant for EME banks.

Box B provides two prominent examples of substantial strategic and business model shifts at European G-SIBs, RBS and UBS. In both cases, these banks have downsized their investment banking units and repositioned to focus largely on other intermediation activities. In addition to illustrating key trends in bank business models identified in this report, the examples highlight the process of change at the institution level.

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[16]　For example, some EME banks have increased their wholesale funding, as discussed below.

Consolidation in the Spanish banking system

The Spanish banking system withstood the first wave of the GFC reasonably well. However, as the crisis developed, the imbalances built up previously (high credit growth, risk concentration in real estate and a growing reliance on wholesale funding) placed the banking sector, in particular saving banks, in a highly vulnerable position. Loan performance and solvency positions then deteriorated rapidly. The authorities' initial response was to seek private sector solutions to the required solvency and balance sheet improvements, as well as to encourage consolidation among savings banks to address overcapacity and increase operating efficiency. In 2009, the Fund for Orderly Bank Restructuring (FROB) was set up to allow public funds to be injected into the banking sector, subject to certain conditions, including stricter capital requirements, strengthened corporate governance arrangements, capacity adjustments and efficiency gains. In total, a considerable amount of state aid (€62.7 billion, including the contribution of the Deposit Guarantee Fund and support of the European Stability Mechanism) was injected into savings banks.

As a result, the Spanish banking sector has undergone extensive restructuring and consolidation. In the 2008–16 period, the number of credit institutions (excluding foreign branches) declined from 195 to 125 (Graph A.1, left-hand and centre panels), while total domestic banking system assets fell by around 20%. Consolidation was concentrated among savings banks, whose numbers fell from 45 to two. Some savings banks were acquired or absorbed by commercial banks or other savings banks, others were integrated into an Institutional Protection Scheme (IPS) or merged, with eight of the resulting saving banks being transformed into commercial banks (following a legal reform).[1] In several cases, the integration processes involved more than one stage. Consolidation also occurred among cooperatives, with the main process being the establishment of an IPS that brought together 19 credit cooperatives. These changes have led to an increase in banking system concentration, with the domestic assets of the top five banks accounting for 65% of system assets in 2016, up from 51% in 2008.

Structural adjustment is evident in bank distribution networks, with branch and employee numbers declining substantially (Graph A.1, right-hand panel), and staffing costs falling by 24% from 2008 to 2016. Bank balance sheets have been substantially strengthened, notably capital buffers, with the aggregate Tier 1 capital ratio rising from 7.8% in 2008 to 12.8% in 2016.

Spanish banking system capacity

Graph A.1

Bank assets and credit

Number of deposit institutions

Number of branches and employees
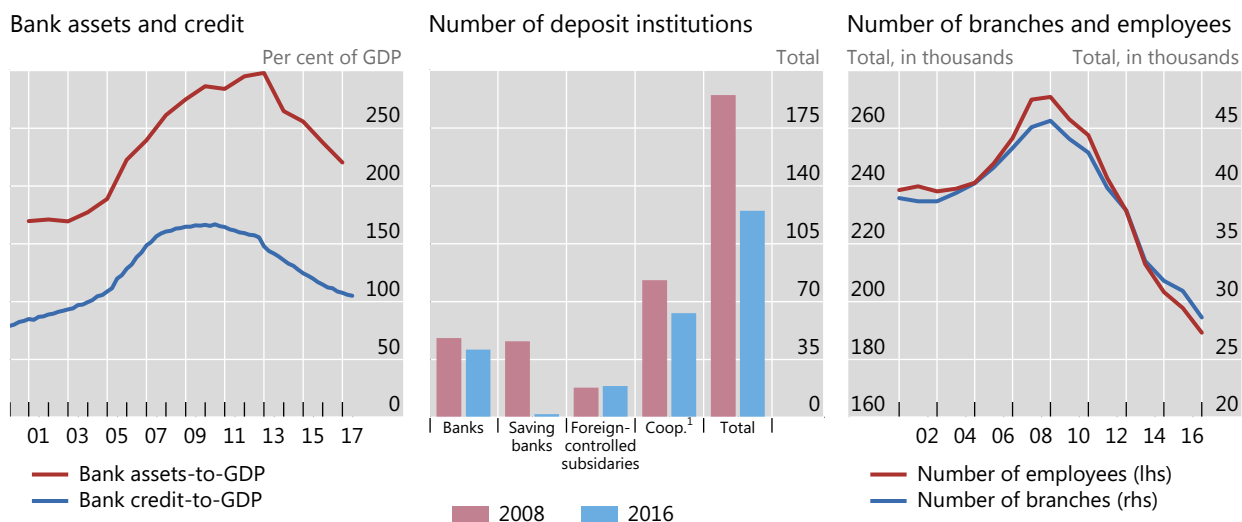
[1] Cooperatives.

Source: National data.

[1] An Institutional Protection Scheme (IPS) is a contractual agreement among the participating institutions involving the assignment to a central institution of the capacity to establish and implement business strategies and internal and risk control tools. Participants also agreed to pool at least 40% of their liquidity, solvency and earnings. IPS formed in this manner became consolidated groups and were, in essence, mergers ("cold mergers", as they were called) since, for economic, albeit not legal, purposes, each participant lost its autonomy. Full pooling of liquidity, solvency and results was achieved at most of the IPS formed.

Restructuring and business model adjustment at RBS and UBS

The case of RBS

RBS expanded its balance sheet rapidly in the run-up to the financial crisis, from around £750 billion in 2005 to £2,400 billion – more than UK GDP – in 2008 (Graph B.1, left-hand panel). This pre-crisis growth was driven by an expansion of RBS's wholesale and derivatives business, including the acquisition of the Dutch bank ABN AMRO in 2007. The expansion was funded largely by wholesale debt (Graph B.2, centre panel). RBS failed in October 2008 and was recapitalised by the UK government as part of a system-wide package of measures for the UK banking system.

RBS subsequently sought to shrink and strengthen its balance sheet in a plan agreed with the European Commission, given the involvement of state aid. In 2009 RBS set up a "non-core" division to manage many of the bank's higher-risk assets; these assets were reduced by more than £150 billion between 2010 and 2013. Overall, the bank's balance sheet was strengthened through a combination of whole-business disposals, run-offs, asset sales and write-downs rather than through capital raisings or earnings retention. As the bank made substantial losses over the period, it was unable to generate new capital organically.

Following a review of RBS in 2013 by the UK government, its majority shareholder, RBS announced a further set of measures to become a bank focused on lending to UK businesses and households. These included an accelerated exit from Citizens, a US retail bank, further shrinkage of its investment banking unit and a plan to run down £38 billion of high-risk or non-performing assets (including loans in its Irish bank subsidiary and commercial real estate lending) over a three-year period in a new internal bad bank. RBS also planned the sale or wind-down of most of its global footprint, from 38 countries to 13, and trade finance and cash management outside the United Kingdom and Ireland.

By 2016, RBS had narrowed its focus to become a bank serving clients in the United Kingdom and western Europe and had achieved a CET1 capital ratio of 13.4% (compared with a core Tier 1 ratio of 6.1% at end-2008). Its revenues have increasingly come from net interest income generated by lending, with its investment banking activity refocused on foreign exchange and fixed-income markets (Graph B.1, right-hand panel). While RBS has already undertaken significant cost-cutting, improving its underlying cost efficiency remains a focus. Legacy issues have also continued to adversely affect its bottom line profitability, despite having achieved run-down targets for the internal bad bank ahead of schedule. RBS reported an attributable loss of £7.0 billion in 2016, including litigation and conduct costs of £5.9 billion and restructuring costs of £2.1 billion. Looking forward, RBS will remain in a period of major restructuring through 2019 driven by the need to meet UK legislative requirements for the ring-fencing of core retail banking activities from wholesale and investment banking activities. RBS also remains subject to state aid requirements. In 2016, RBS's management renewed its commitment to a long-term CET1 ratio of at least 13% and to achieving a cost-to-income ratio of less than 50%, and a 12% return on tangible equity by 2020.

The case of UBS

In the pre-crisis years, UBS's investment banking unit contributed a little less than half of group before-tax profit (and revenue) (Graph B.2, left-hand panel). The unit was the source of large losses during the crisis, primarily on US real estate and other credit positions.[1] A package of measures by the Swiss Confederation and the Swiss National Bank was required in late 2008 to stabilise the bank.

UBS has subsequently shifted away from investment banking activities towards its other existing businesses, specifically global wealth management and Swiss retail and corporate banking. In 2009 it announced a repositioning of its investment bank towards a client-centric model focused on more flow and fee business. The strategic change was accompanied by a sizeable reduction in its balance sheet, which halved between 2007 and 2010; the downsizing of the investment banking unit accounted for most of this decline (Graph B.2, centre panel).[2]

In 2011 and 2012, the bank presented an updated strategy, with a further diminished role for investment banking. The intention was that the investment bank should support the bank's new strategic focus in wealth management and Swiss retail and corporate banking. Furthermore, UBS decided that its investment bank would exit a substantial number of fixed income business lines, in particular complex and capital-intensive credit and interest rate products. These changes resulted in a further shrinking of the bank's balance sheet and a sizeable reduction of fixed income instruments held at fair value (Graph B.2, centre panel). As a consequence of the exit process, UBS transferred some of the investment bank's assets to its corporate centre for run-off (legacy unit). By the end of 2014, UBS considered its strategic transformation process to be complete.

The strategic adjustments described above are visible in the breakdown of group profit, with the investment bank accounting for only a small share in recent years (although the share of revenue is a bit higher, at about one third). As a result of the adjustments, domestic activities have become more important, although foreign activities continue to play a major role, with the majority of assets and employees located abroad.③

RBS balance sheet and profit

Graph B.1

Asset composition
GBP trn

Liability composition
GBP trn

Revenue and operating expenses
Per cent

- Loans and advances to customers
- Derivatives
- Debt securities, equity instruments & loans to banks
- Other assets

- Equity excluding minority interest
- Customer accounts
- Derivatives
- Wholesale funding & other liabilities

- Net interest income/total income
- Cost-to-income ratio

Source: RBS annual reports.

UBS balance sheet and profit

Graph B.2

Profits before tax
CHF bn

Balance sheet by segment[2]
CHF trn

Financial assets at fair value[3]
CHF trn

- Wealth Man., Asset Man., Retail & Corp.
- Investment Banking
- Corporate Center[1]
- Group

- Wealth Man., Asset Man., Retail & Corp.
- Investment Banking
- Corporate Center[1]

- Debt instruments
- Equity instruments
- Other[4]
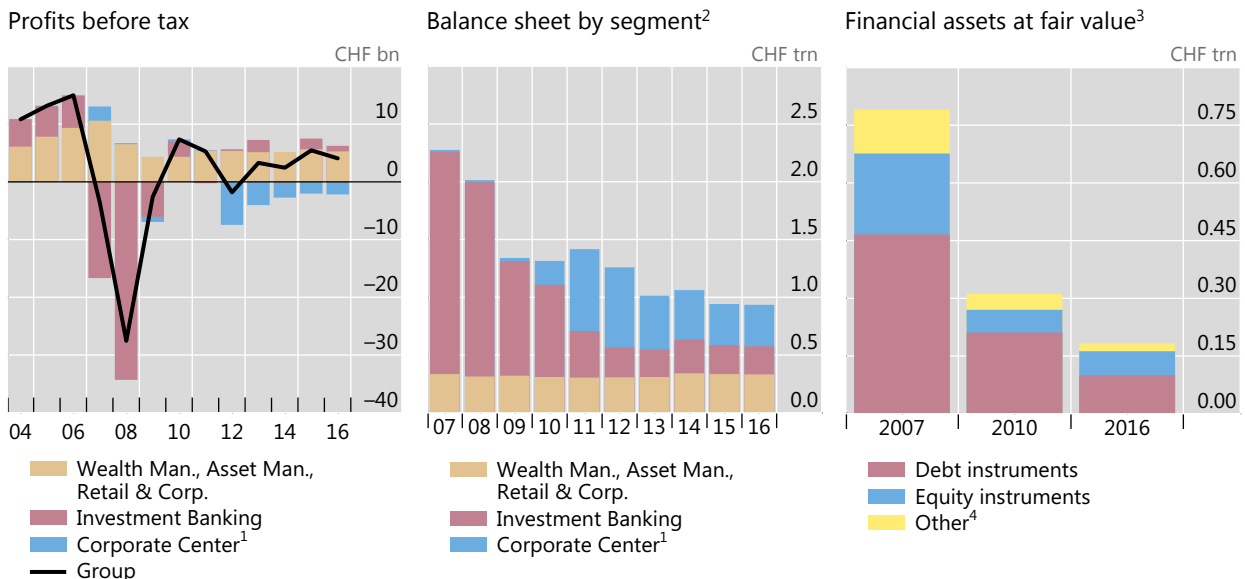
[1] Including legacy unit.   [2] Third-party view.   [3] Excluding positive replacement value.   [4] Including precious metals and commodities.

Source: UBS annual reports.

① UBS (2010) ② Part of the balance sheet shrinkage was due to an active reduction or compression of positions, and part was market-driven.   ③ Around two thirds of average interest-earning assets were attributed to foreign activities in 2016, compared with almost 90% in 2007.

To help inform its business model analysis, the Group undertook a classification exercise for its sample of large banking groups. Graph 6 (left-hand panel) presents trends in the share of banks falling into one of four different business model types: retail-funded commercial banking, wholesale-funded commercial banking, trading and processing, and universal banking. The allocation of banks into business model types is based on a statistical methodology that uses selected balance sheet ratios to discriminate across the four profiles (see Annex 3 for further details).[17] The main message from this analysis is that there has been an increase in the popularity of the retail-funded profile at the expense of the wholesale-funded one and, to a lesser extent, the universal one. While there is no major change in the popularity of the trading model, some G-SIBs have shifted from the trading category to the universal category after the crisis (and, as discussed elsewhere, trading activities have declined at many banks). Relatedly, the aggregate assets of banks in the trading category have declined substantially (Graph 6, right-hand panel).

Bank business models[1]   Graph 6

Popularity of business model type[2]   Aggregate assets of business model type[3]
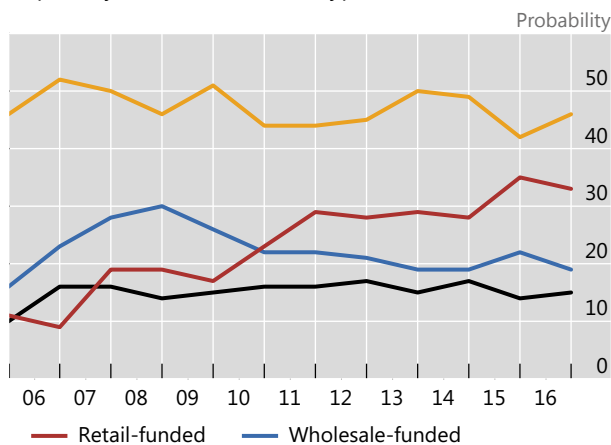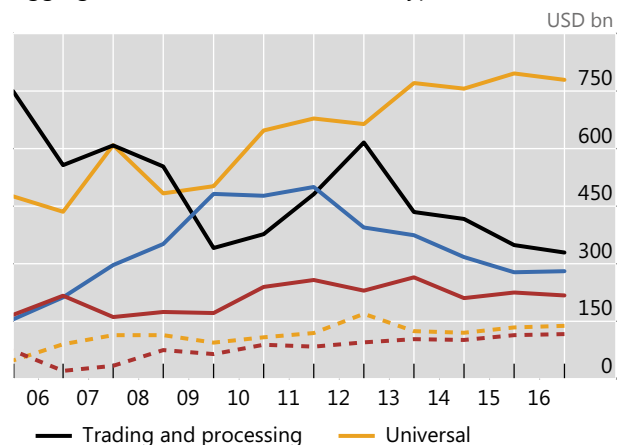
— Retail-funded   — Wholesale-funded   — Trading and processing   — Universal

[1] Based on the sample of individual advanced economy and EME banks in Annex 2, subject to data availability. [2] Each line plots banks' average loading on a given model in a given year. A loading is the posterior probability of a bank belonging to a given model in a given year, as determined by discriminant analysis. For a given year, the (average) loadings sum up to 1 across models. [3] Net of derivative assets; the solid/dashed lines correspond to advanced/emerging market economy banks.

Sources: Roengpitya et al (2017); Fitch Connect.

Asset portfolios

At a broad level, banks' share of loans in total assets has tended to rise, although movements vary significantly across countries, with Canada, India, Mexico and Switzerland experiencing the largest increases (Annex Tables 1.10 and 1.11). The composition of banks' assets has generally shifted away from debt securities over the

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[17]   It is important to note there is no one way to classify banks' business models. The method used in Roengpitya et al (2017) has the benefit of being less judgment-based than some others. It is also a useful approach to capturing changes in business models over time, which is important given the focus of the report on structural change. See the IMF (2017a) for a finer business model classification of G-SIBs based on revenue shares in 2016.

post-crisis period. The main exceptions are in Italy, where holdings of government securities have risen noticeably, and in the United States.

More important than changes in broad asset structure have been several underlying shifts within banks' asset portfolios, which together signal a move away from more complex or capital-intensive assets towards assets that typically pose less risk. The most notable post-crisis trend in this respect is a marked increase in the share of liquid asset holdings, including in Australia, several European countries, the United Kingdom and the United States (Graph 7, left-hand panel and Annex Table 1.12). For some countries the increase has reflected higher cash or central bank balances, in other cases government debt holdings have increased substantially. As the share of available-for-sale debt securities held for liquidity purposes has generally increased, many banks have cut down their proportion of interbank assets (which is mirrored in the reduction in interbank liabilities noted below).

Large advanced economy banks have run down their legacy or "non-core" assets considerably – for G-SIBs they have fallen from around 12% to 5% of their assets over 2013–16.[18] In addition, many large banks have reduced their exposure to trading assets and more complex securities. The median share of trading assets in total assets for individual G-SIBs has declined from around 20% to 12% over 2009–16 (Graph 7, centre panel). G-SIBs' share of more complex Level 2 and Level 3 assets have also fallen, in particular for banks with relatively high shares of Level 3 assets (those for which fair value cannot be determined from market prices or standard pricing models). Another trend related to the complexity of large banks' activities has been the reduction in OTC derivatives – in large part because of derivatives regulatory reforms – with this trend most evident for G-SIBs which have larger derivatives positions relative to their assets (Graph 7, right-hand panel).

Bank asset portfolios   Graph 7

Share of liquid assets in total assets, in per cent[1]
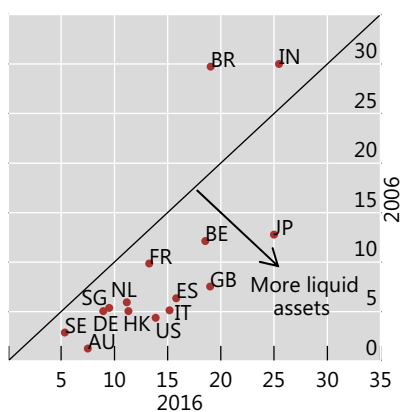
G-SIBs' share of complex assets[2]
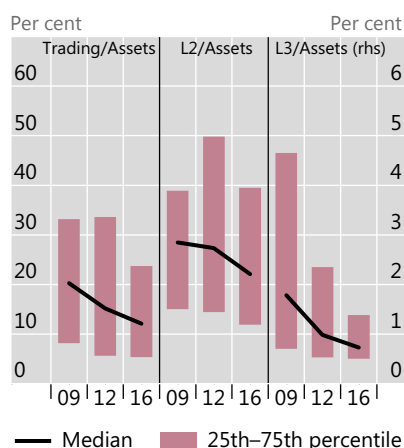
G-SIBs' OTC notional derivatives to assets
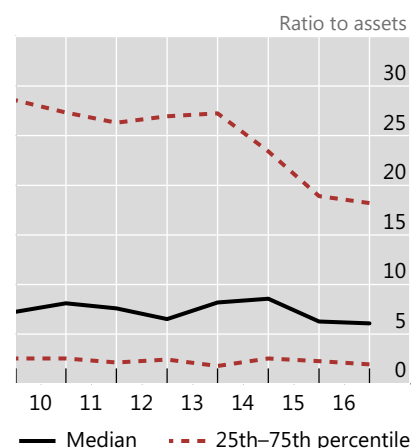
[1] Cash and balances with central banks and government securities as a share of total assets; for country codes, refer to Graph 4.   [2] Level 2 assets are those where fair value is determined by standard pricing models using inputs that are directly or indirectly observable. Level 3 assets are those where fair value cannot be determined by observable market prices or standard pricing models.

Sources: SNL; national data; public filings.

[18]   IMF (2017a).

Within banks' lending portfolios, the share of residential mortgages has increased across most countries, continuing a longer-run trend associated with the considerable rise in housing prices (Graph 8, left-hand panel and Annex Table 1.13). Increases have occurred in countries that fared better in the crisis (Australia, Canada, Sweden and a few EMEs), but have also been evident in some European countries (Belgium, United Kingdom). The notable exception to this trend has been the United States, given that housing problems were at the core of its crisis. Changes in the share of business lending in total lending have been more mixed across countries, although movements in either direction have tended to be larger for EMEs, notably the decline for China (Graph 8, centre panel, Annex Table 1.14).

The share of non-performing loans (NPLs) in total loans rose sharply in the euro area, United Kingdom and the United States after the onset of the crisis, but the rise was far more muted elsewhere (Graph 8, left-hand panel, Annex Table 1.16). NPLs subsequently decreased at a sluggish pace in the euro area in conjunction with relatively weak macro-financial conditions, as well as some country-specific institutional factors, and remain comparatively high in Italy and Spain.[19, 20] NPL ratios rose for some EMEs in 2015 and 2016, particularly in India.

Funding structures

Since the crisis, advanced economy banks have responded to market and supervisory pressures to boost stable funding by significantly shifting their funding composition away from wholesale funding towards deposits (Graph 9, left-hand panel, Annex Tables 1.17 and 1.18). The shift away from market-based funding has been aided by highly accommodative monetary policies in advanced economies.[21] The change has been most pronounced for European banks given their greater use of market-based funding prior to the crisis. Conversely, banks in some EMEs have grown their use of wholesale funding, albeit from a relatively low level, as their access to capital markets has improved and credit growth has remained relatively robust. There has also been a widespread rise in equity funding as a result of higher regulatory capital standards.

Underlying the decline in many banks' share of wholesale funding has been a cutback in the use of short-term funding, and a contraction in interbank liabilities (Graph 9, left-hand and centre panels).[22, 23] There is anecdotal evidence that some banks have diversified their international investor base away from financial institutions and money markets by attracting funds from other investors, such as cash-rich corporations.[24]

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[19]   One institutional factor that can be important for the resolution of NPLs is the efficiency of the legal process. A protracted debt workout can generate uncertainty about asset values, increasing the discount on NPLs from potential buyers and thus deterring banks from disposing of them (FSI (2017)).

[20]   Nevertheless, for Spain, the NPL ratio calculated on a consolidated basis is considerably lower than when calculated on a domestic basis (for 2016, 5.6% compared with 9.2%).

[21]   For example, accommodative monetary policy has played a role in reducing the need for banks to trade reserves through the repo market (CGFS (2017)).

[22]   Also see, for example, IMF (2013) and van Rixtel and Gasparini (2013).

[23]   Notwithstanding the post-crisis shift to more stable funding sources for the aggregate euro area banking system, banks in some euro area countries (Greece, Ireland, Portugal, Spain and Italy) became reliant on central bank funding as sovereign debt concerns intensified in 2011 and 2012. The average share of central bank funding in total funding has since fallen as sovereign debt concerns have receded (although Greek banks have been an exception). For further details, see ECB (2016b).

[24]   Debelle (2017).

Bank lending composition and non-performing loans

In per cent

Graph 8

Residential mortgage loans share of total loans[1]

Business loans as a share of total loans[1]

Non-performing loans ratio[2]
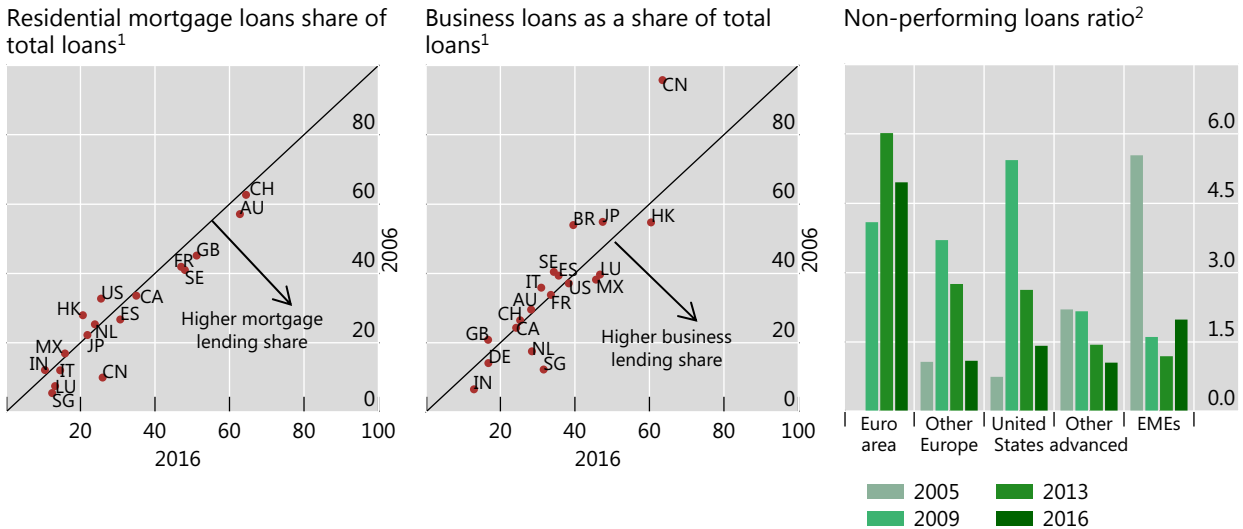
[1] For country codes, refer to Graph 4.   [2] Non-performing loans are reported gross of loans provisions and can be subject to significant measurement differences across countries. Weighted average for groups of countries, based on total loans. Euro area calculated as a weighted average of individual reporting countries, as in Annex Table 1.16.

Source: National data.

Bank funding structures

Graph 9
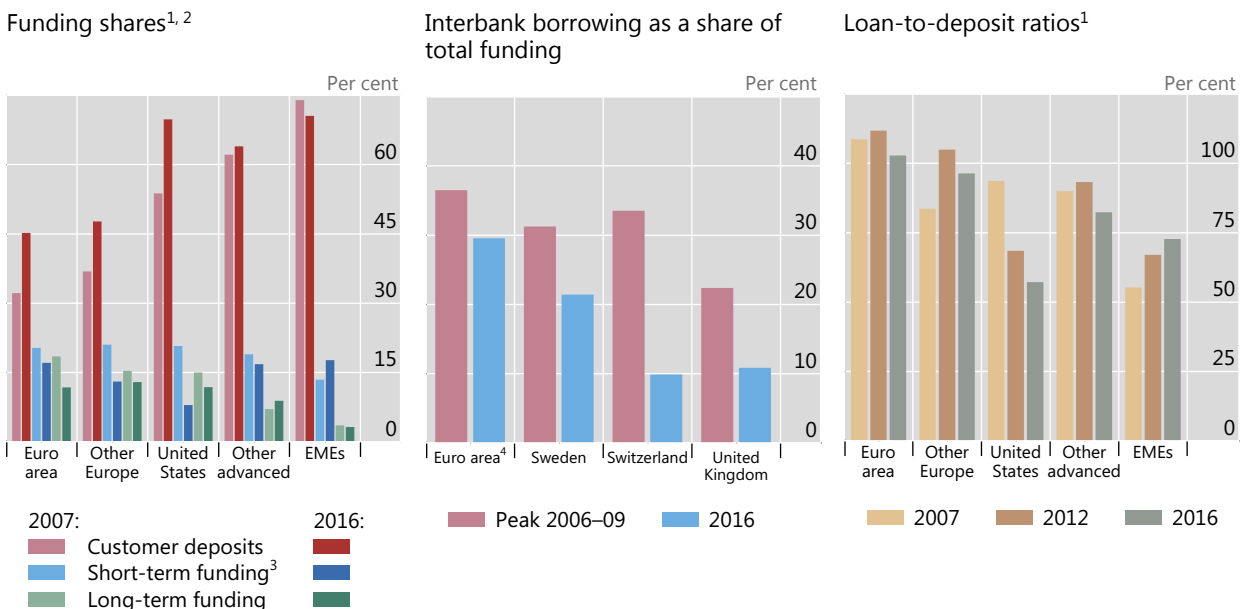
Funding shares[1, 2]

Interbank borrowing as a share of total funding

Loan-to-deposit ratios[1]

[1] Based on the sample of individual advanced economy and EME banks in Annex 2, subject to data availability.   [2] Relative to total liabilities, asset-weighted average ratios.   [3] Excluding customer deposits.   [4] Annual peak value of weighted average based on total assets for Belgium, France, Germany, Luxembourg, Netherlands and Spain.

Sources: Fitch Connect; SNL; national data; BIS calculations.

Greater use of deposit funding since the crisis has led to a decline in many advanced economy banks' loan-to-deposit ratios – an indicator of banks' use of wholesale markets to fund their lending (Graph 9, right-hand panel). Loan-to-deposit ratios for EME banking systems have typically risen since the crisis, albeit from relatively low levels, reflecting notable credit growth.

Capital positions

After the crisis, both markets and supervisors have put increased emphasis on stronger capitalisation as being a key determinant of banks' capacity to cope with adverse shocks. Strengthened capital buffers at the bank level have broader benefits at the system level because of the potential for reduced contagion between banks.

Banks' common equity capital ratios have generally risen significantly over the past decade (Graph 10, left-hand panel and Annex Table 1.19–1.21). Outside Europe, most of the improvement in system-wide capital ratios has been due to increases in capital (Graph 10, centre panel). Banks have raised higher-quality common equity capital by issuing new equity in the market and/or retaining earnings. The accumulation of retained earnings has been supported by dividend payout ratios that have been cut despite the fall in returns on equity, often because of supervisory guidance.[25] Payout ratios have increased recently in some countries where profitability has recovered to a greater extent.

Banking capitalisation   Graph 10
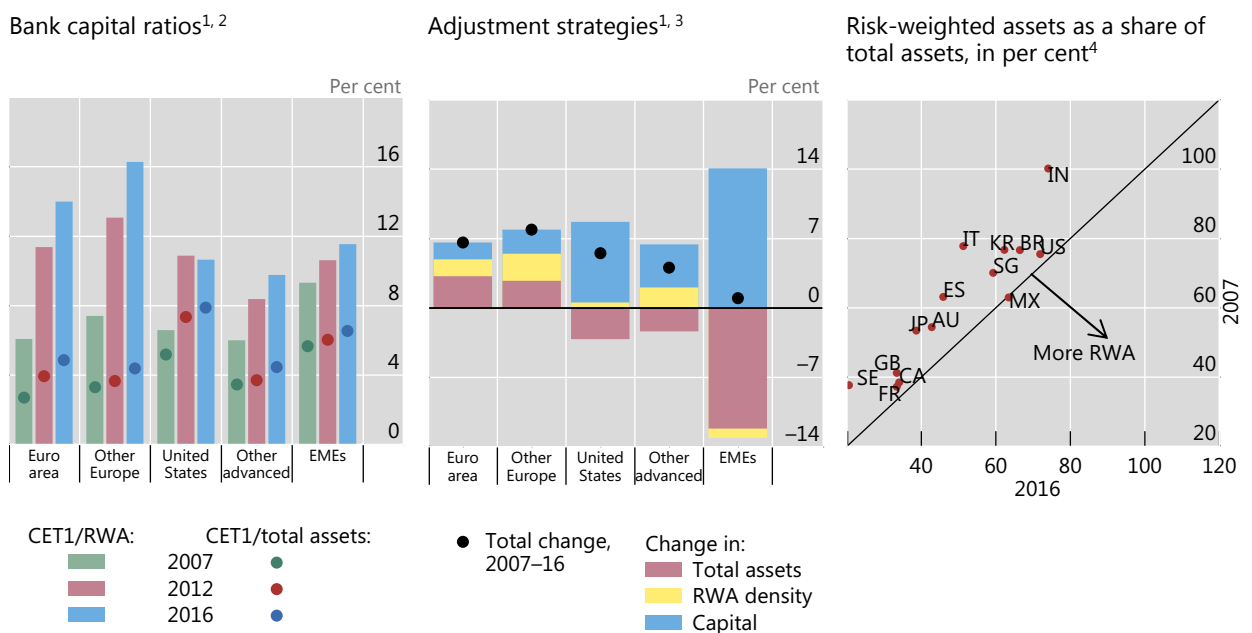
Bank capital ratios[1, 2]   Adjustment strategies[1, 3]   Risk-weighted assets as a share of total assets, in per cent[4]

CET1/RWA: CET1/total assets:
  ▮ 2007   ● 2007
  ▮ 2012   ● 2012
  ▮ 2016   ● 2016

  ● Total change, 2007–16

Change in:
  ▮ Total assets
  ▮ RWA density
  ▮ Capital

[1] Based on the sample of individual advanced economy and EME banks in Annex 2, subject to data availability. [2] Median ratios. [3] Decomposes the change in the Common Equity Tier 1 (CET1) capital ratio into additive components. The total change in the ratios is indicated by dots. The contribution of a particular component is denoted by the height of the corresponding segment. A negative contribution indicates that the component had a capital ratio-reducing effect. All figures are weighted averages using end-2016 total assets as weights. [4] For country codes, refer to Graph 4.

Sources: B Cohen and M Scatigna, "Banks and capital requirements: channels of adjustment", *BIS Working Papers*, no 443, March 2014; SNL; BIS calculations.

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[25]   Cohen and Scatigna (2015).

Declines in risk-weighted assets have also contributed to higher capital positions in most regions (Graph 10, right-hand panel). The average risk weight ("risk density") on banks' assets has fallen, reflecting a shift in the composition of credit portfolios towards assets with lower risk weights (eg more liquid assets and mortgages in a number of cases, less complex assets) and an improving credit environment (including lower interest rates) (Annex Table 1.22).[26] In addition, optimisation of banks' internal capital models and practices in the risk-based capital framework has played a role.[27] Balance sheet contraction has also been a factor in many European banking systems – for example, it accounted for about half of the increase in euro area banks' capital ratios. By contrast, EME bank balance sheets have grown substantially, modestly dampening their capital ratios.

Bank leverage has declined significantly since the crisis (Annex Table 1.23). For example, the ratio of Tier 1 capital to total (unweighted) assets for US banks rose from 7.2% in 2008 to 9.3% in 2016, and from 3.7% to 5.8% for euro area banks over the same period.[28]

Bank capital profiles and revenue mix[1]

Graph 11

Capital-to-assets by business model — Per cent, median bank (Advanced economies / EMEs); categories: Wholesale-funded, Trading and processing, Retail-funded, Universal (Advanced economies); Retail-funded, Universal (EMEs). Periods: 2005–07, 2008–09, 2010–13, 2014–16.

Risk density by business model[2] — Per cent, median bank (Advanced economies / EMEs); same categories and periods.

Revenue shares — Per cent (G-SIBs / Other large banks); years 05–06, 10–11, 15–16. Components: Net interest, Net fees and commissions, Net securities, Other.

[1] Based on the sample of individual advanced economy and EME banks in Annex 2, subject to data availability, data from 2005 to 2007 for EMEs not shown. Total assets, net of derivative positions; period ratios are simple averages across the years.   [2] Ratio of risk-weighted assets to total assets.

Sources: Roengpitya et al (2017); Fitch Connect; SNL.

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[26]   It should be noted that average risk weights may not fully capture risks to banks associated with a build-up of common exposures over the business cycle or other factors contributing to the build-up of systemic risk.

[27]   One example is synthetic securitisations, where the ownership of the securitised assets remains on the balance sheet of the originators, but some part of the credit risk is transferred to investors.

[28]   Comparisons of leverage ratios across regions can be complicated by different accounting standards, in particular the treatment of derivatives on the balance sheet.

Capitalisation has improved across all business model types in advanced economies, most notably for trading and universal banks, which were more highly leveraged prior to the crisis (Graph 11, left-hand panel). A reduction in average risk weights has contributed to higher risk-based capital positions for all business profiles except trading banks, which have seen a significant rise in their risk-weighted assets because of an increased focus on lending and the post-crisis introduction of stricter minimum regulatory capital requirements for market risk and complex securities (Graph 11, centre panel).

Revenue mix

Revenue shares can provide an indication of the type of broad activity that banks engage in, and thus may help signal shifts in bank business models. There has been a marked change in the revenue mix of G-SIBs and other large banks at a high level from the pre-crisis period, with their shares of net interest revenue rising substantially at the expense of securities revenue and "other revenue" (which includes, notably, securitisation revenue) (Graph 11, right-hand panel). Advanced economy banks, particularly those from Canada, the United States and larger European countries, have driven the aggregate shift towards net interest revenue, whereas EME banks, especially Chinese banks, exhibit the opposite trend as revenue composition has shifted towards net fees and commissions, in part reflecting diversification beyond their heavy emphasis on lending.

The changes in revenue mix are consistent with the above-noted repositioning of many advanced economy banks' business models. Other data that classify revenue into industry segments support this trend, showing an overall shift into commercial banking (credit intermediation) and a decline in the share of investment banking revenue and revenue from non-traditional sources.[29] They also show a narrowing of the scope of bank activities, particularly among larger banks. There is some variation across firms, however, with higher capitalised banks on average having widened their revenue mix in the post-crisis period.

3.4 International banking

In the decade prior to the financial crisis, banking became increasingly global and grew faster than world economic activity and trade.[30] International banking activity has contracted markedly since, with total consolidated bank claims on foreign jurisdictions declining by about 16% over 2007–16 (Table 1).

From a bank nationality perspective, the global reduction in foreign banking can be attributed to the retrenchment of European banks: their total foreign claims fell by around 40% over this period, whereas claims of non-European banks rose in aggregate (Annex Tables 1.24 and 1.25). Most European banks reported significantly lower foreign claims, with Spanish banks as the notable exception.

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[29]   Specifically, segment data based on the North American Industry Classification System (NAICS).

[30]   McCauley et al (2017).

Much of the reduction in European banks' claims occurred within the European region, in particular the troubled euro area countries (Graph 12, left-hand panel). European banks also pulled back from other regions, including the United States.

The post-crisis adjustments of many large advanced economy banks have translated into a substantial decline in the number of jurisdictions in which they have operations. Banks tended to withdraw when local operations were smaller in market share or length of tenure, or from countries that are more distant or less important for trade.[31] This trend has contributed to a reduction in the share of foreign bank assets in a number of domestic banking systems (Annex Table 1.26).

As European banks pulled back, the foreign claims of other banking systems have tended to rise. US banks and banks from advanced economies that were less affected by the financial crisis – such as major banks from Australia, Canada and Japan – have expanded their international presence to varying degrees. Banks from a number of emerging markets, including those from larger markets (Brazil, China, India, Russia), have also grown their international footprint, mainly within their own region. The international expansion of the five largest Chinese banks is particularly notable: their foreign assets have risen sixfold since 2007, to be roughly equivalent to around 6% of global foreign bank claims at end-2016.[32]

In comparison to the pre-crisis global expansion of many advanced economy banks, EME banks' expansion has been relatively regional in nature. The increase in EMEs' foreign banking presence within their own regions, albeit from relatively small positions leading into the crisis, is particularly evident in Southeast Asia and has also occurred in Central America and the Commonwealth of Independent States (Graph 12, centre panel).[33]

Consolidated foreign bank claims[1]
Table 1

	USD billions		% change	Share of total (%)	
	2007	2016	2007–2016	2007	2016
Aggregate claims	29,302	24,624	–16	100	100
Of which, by bank nationality:					
Advanced Europe	23,608	14,300	–39	81	58
Other advanced	5,147	9,046	76	18	37
EMEs	300	744	148	1	3
Of which, by claim type:					
International[2]	18,285	14,263	–22	62	58
Local claims in local currency	11,017	10,348	–6	38	42

[1] Claims for each year are as at end-December. Aggregate claims relate to that of domestic banks in reporting countries   [2] Comprise cross-border claims in all currencies and local claims in foreign currency of counterparties where booking office is located.

Source: BIS consolidated banking statistics (immediate counterparty basis).

[31]   Claessens and van Horen (2014).

[32]   Consolidated foreign claims data shown in Table 1 and elsewhere in this report do not encompass Chinese and Russian banks. We include foreign assets figures here for Chinese banks for rough illustrative purposes only.

[33]   CGFS (2014b), IMF (2015) and Remolona and Shim (2015).

European banks' foreign claims on:
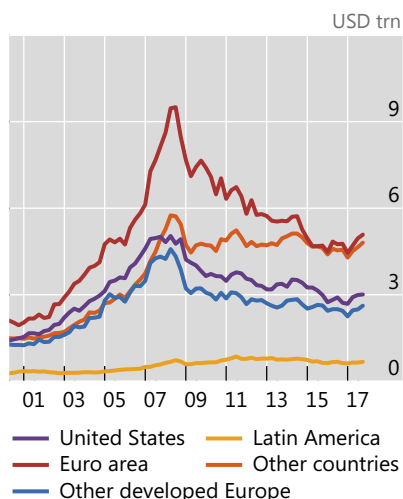
Share of international claims on EME regions by intraregional banks[1]
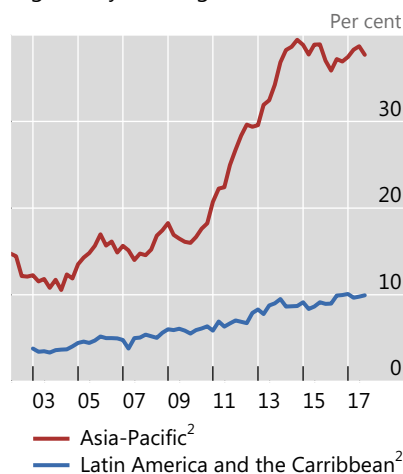
Share of local claims in local currency[3]

United States   Latin America   Asia-Pacific[2]
Euro area   Other countries   Latin America and the Carribbean[2]
Other developed Europe
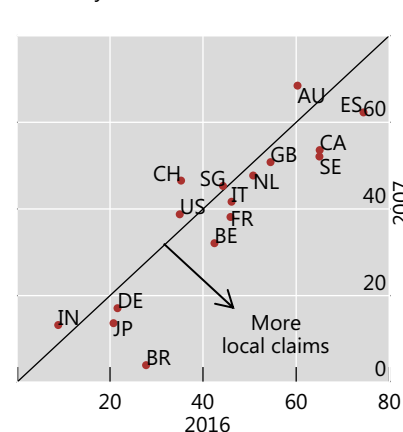
[1] Sum of all cross-border claims and locally extended claims in foreign currency. [2] For Asia-Pacific, sum of international claims on the region of banks headquartered in Chinese Taipei, Hong Kong SAR, India, Korea, Singapore and the offices of banks located in the region which have a parent institution from a non-BIS reporting country (assuming these are headquartered in Asia). For Latin America and the Caribbean, sum of international claims on the region of regional banks (Brazil, Chile, Mexico, Panama) and the offices of banks located in the region which have a parent institution from a non-BIS reporting country (assuming these are headquartered in Latin America and the Caribbean). [3] As a percentage of total foreign claims; for country codes, refer to Graph 4.

Source: BIS consolidated banking statistics on an immediate counterparty basis.

Aside from changes in the geographical distribution of exposures, the most notable trend in foreign banking is the shift away from cross-border lending towards local lending through banks' branches and subsidiaries. International claims declined by more than 20% over 2007–16, whereas the decline in local currency claims was more modest. In addition, banks' foreign claims have been increasingly funded locally. These aggregate trends mainly reflect changes for euro area banks, although greater localisation of foreign banking is evident for a range of bank nationalities and pre-existing models (Graph 12, right-hand panel). For example, Swedish banks now largely fund their operations in the Baltics from local deposits, whereas previously most funding was sourced from the parent using wholesale markets.

3.5 Bank performance

Overall profitability

Profitability has declined considerably in many banking systems over the past decade. System-wide returns on equity (RoE) – that is, net profit divided by average equity – were generally in the range of 10–15% in the few years preceding the crisis (Graph 13, left-hand panel and Annex Table 1.27). Such returns on equity were historically high and, in many cases, were supported by unsustainable leverage and risk-taking (see discussion of excesses in Section 2.1).

There was a stark reversal during 2008–09, with banks in Europe and the United States recording aggregate losses. Although RoE has since drifted higher for the US banking sector, it has remained below shareholder return expectations, which

are tied to these banks' estimated cost of equity (see 4.3 below). Profitability has been even weaker within Europe, both for large and smaller banks. Banks in Australia, Canada and EMEs performed better during the crisis, yet their rates of return have also slowed over recent years. From a business model perspective, RoE has fallen across all types in the post-crisis period (Graph 14, right-hand panel).

Banks' return on assets (RoA) has followed a similar pattern across countries, although the post-crisis decline is generally less noticeable due to relative changes in leverage (Graph 13, left-hand panel and Annex Table 1.28). Return on risk-weighted assets – a simple measure of risk-adjusted returns – provides a potentially more favourable view of bank profitability trends (Annex Table 1.29). It has declined by less than RoE for some large banking systems and is near pre-crisis levels (with the exception of some European countries and EMEs).

Revenues and costs

The decline in non-interest income is the main driver behind the post-crisis fall in revenue relative to assets for most advanced economy systems (Graph 14, left-hand panel and Annex Tables 1.32–1.34). A key driver is trading revenue at large banks, mainly reflecting a reduction in fixed income trading revenues (see Section 5.2 below).

Net interest revenue across the large advanced economies was weighed upon by weak lending growth in the few years after the crisis, as the private sector in aggregate deleveraged and banks rehabilitated their balance sheets (Graph 14, centre panel) (see Section 5.1 below). Lending growth has increased over the past few years, with the exception of the United Kingdom. Lending has expanded relatively strongly in a number of EMEs and Canada over the post-crisis period.

Bank profitability indicators

In per cent   Graph 13
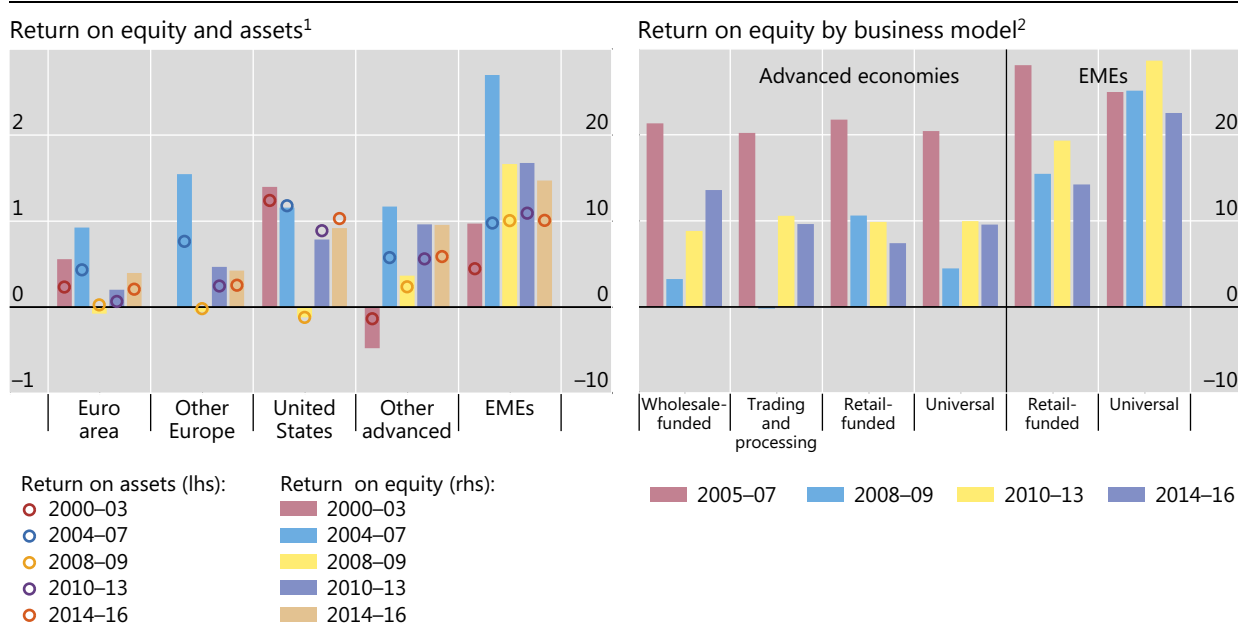
Return on equity and assets[1]

Return on equity by business model[2]

Return on assets (lhs):
- ○ 2000–03
- ○ 2004–07
- ○ 2008–09
- ○ 2010–13
- ○ 2014–16

Return on equity (rhs):
- 2000–03
- 2004–07
- 2008–09
- 2010–13
- 2014–16

- 2005–07
- 2008–09
- 2010–13
- 2014–16

[1] Weighted average based on average assets; period ratios are simple averages across the years. Euro area calculated as a weighted average of individual reporting countries, as in Annex Tables 1.27 and 1.28.   [2] Based on the sample of individual advanced economy and EME banks in Annex 2, subject to data availability; period ratios are simple averages across the years.

Sources: Roengpitya et al (2017); Fitch Connect; national data.
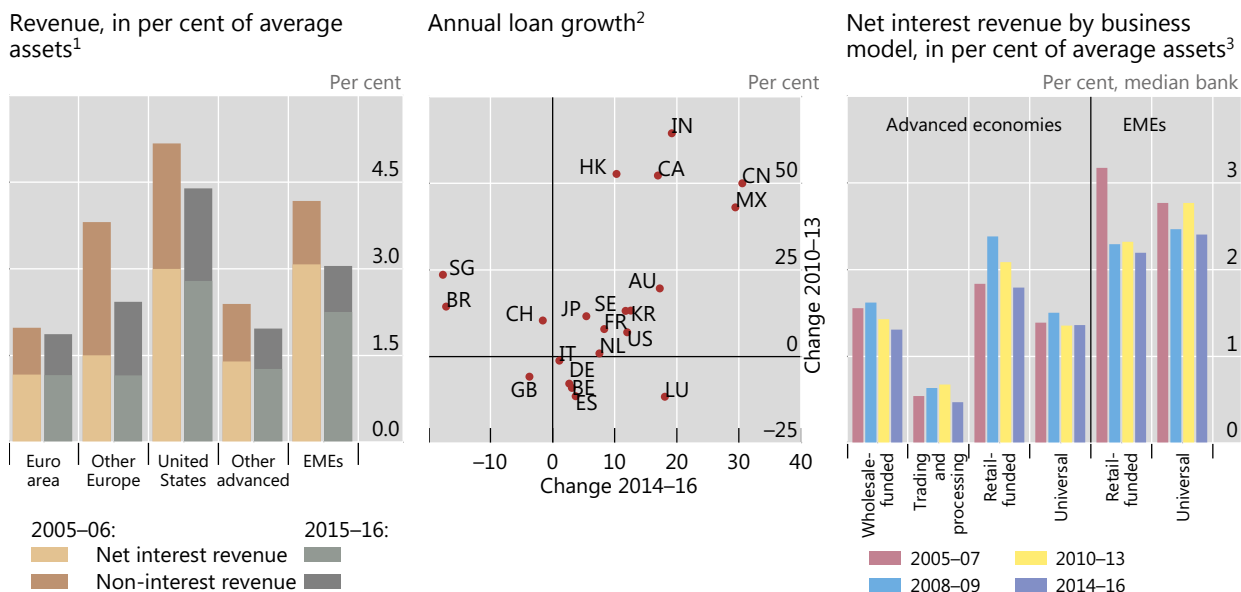
Bank revenues

Graph 14

Revenue, in per cent of average assets[1]

Annual loan growth[2]

Net interest revenue by business model, in per cent of average assets[3]

Per cent

Per cent

Per cent, median bank

2005–06:
Net interest revenue
Non-interest revenue

2015–16:

2005–07
2008–09
2010–13
2014–16

[1] Weighted average based on average assets; period ratios are simple averages across the years. Euro area calculated as a weighted average of individual reporting countries, as in Annex Table 1.33 and 1.34. [2] For country codes, refer to Graph 4. [3] Based on the sample of individual advanced economy and EME banks in Annex 2, subject to data availability, period ratios are simple averages across the years. Relative to total assets net of derivative positions.

Sources: Roengpitya et al (2017); Fitch Connect; national data.

Net interest margins (NIMs) – that is, net interest income as a percentage of average interest-earning assets – are an indicator of the overall profitability of banks' interest-earning activities. Trends in NIMs vary across countries. The NIM has been broadly stable for several banking systems, including Sweden and the United Kingdom, and has risen for the Netherlands (Annex Tables 1.30 and 1.33).[34] This is despite the decline in interest rates to very low or negative levels in these countries, and increases in the shares of liquid assets and stable funding. In contrast, clear declines in NIMs can be observed in a number of other countries over 2010–16, including Brazil, Japan, Korea, Singapore and the United States.[35] As a share of average assets, net interest income has been fairly steady for advanced economy bank types except for retail-funded banks, and has declined for EME banks (Graph 14, right-hand panel).

Cost efficiency in the large advanced economy banking systems seems to have improved little in the post-crisis period, despite renewed focus on cost containment (Graph 15, left-hand and centre panels and Annex Tables 1.31 and 1.35). Operating costs have generally risen broadly in line with, or by a bit more than, operating income. Personnel expenses have remained generally steady as a share of operating

[34] NIM data are not available for a number of jurisdictions in Annex Table 1.28. Readers can also refer to Annex Table 1.31, which presents net interest income as a per cent of average assets. These data should be interpreted with caution since trends could be affected by shifts in the share of interest-earning assets in total assets.

[35] Historical differences in NIMs across countries could reflect numerous factors including the asset and liability mix and competitive dynamics. We do not seek to discuss the historical level differences.
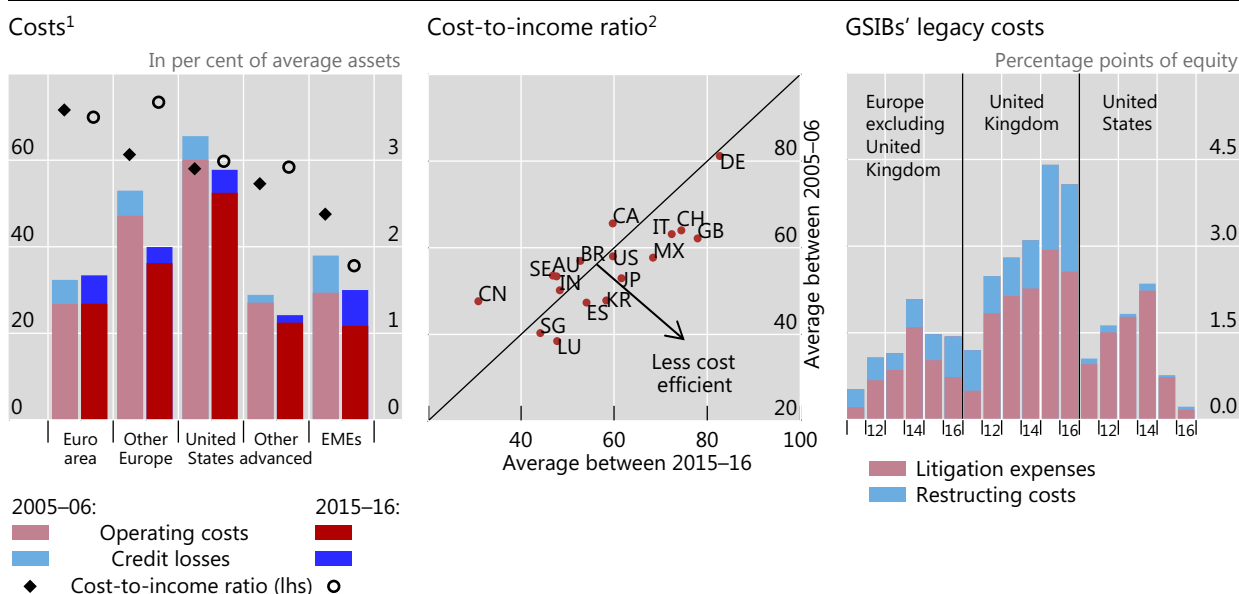
Costs[1]

In per cent of average assets

2005–06:
- Operating costs
- Credit losses
- ◆ Cost-to-income ratio (lhs)

2015–16:
- Operating costs
- Credit losses
- ○

Cost-to-income ratio[2]

GSIBs' legacy costs

Percentage points of equity

- Litigation expenses
- Restructing costs

[1] Weighted average based on average assets; period ratios are simple averages across the years. Euro area calculated as a weighted average of individual reporting countries, as in Annex Tables 1.31, 1.35 and 1.36.   [2] For country codes, refer to Graph 4.

Sources: IMF; national data.

income, while some banks have incurred sizeable restructuring costs and costs associated with past instances of misconduct, although these have subsided more recently for major US banks (Graph 15, right-hand panel). In contrast to the large advanced economies, there has been a decline in the cost-to-income ratios for some banking systems that already had relatively low ratios, including Australia, China and Sweden.

Significant loan losses have also contributed to the decline in banking sector profitability (Annex Table 1.36). Banks in some euro area countries have incurred elevated credit losses and high levels of non-performing loans during the post-crisis period, while a rise in NPLs has weighed on the profitability of several large EME banking systems in the past couple of years. In contrast, reductions in credit losses from crisis peaks have provided a boost to profitability in some other countries, notably the United Kingdom and the United States.

3.6 Summary of key trends in banking

As the crisis revealed structural weaknesses in banking systems, the analysis above details substantial change in the global banking sector subsequently. Adjustments have been more pronounced in Europe and the United States, which were more affected by the crisis. Key trends are summarised below.

Market structure. Banking system asset size and other capacity metrics (the number of bank branches and employees) have generally fallen in Europe relative to economic activity and the population, but have expanded in countries less affected by the crisis, particularly the large EMEs. Bank numbers have also fallen in Europe and the United States, although banking sector adjustment through the exit of banks – the extensive margin – has been less pronounced than through the down-sizing of

individual banks. Concentration in banking systems has tended to increase after the crisis, with some exceptions.

Bank regulatory buffers, business models and international activities. Banks have typically increased their capital and liquidity buffers significantly. Advanced economy banks have tended to reorient their businesses away from trading and more complex activities towards less capital-intensive activities and traditional commercial banking. This pattern is evident in bank asset portfolios, revenue mix and the increased use of customer deposit funding. Of particular note has been a significant increase in mortgage lending across a number of banking systems. Large European and US banks have also become more focused in their international banking activities. European banks in aggregate have reduced their foreign exposures substantially, whereas banks from the large EMEs and other countries that fared better in the crisis have expanded. The relatively significant business model adjustments of European banks and large US banks are consistent with these banks' greater pre-crisis expansion into new activities and jurisdictions.

Performance. Bank returns on equity have declined across countries and business model types since the crisis, in part because of lower leverage (see discussion in Section 4.4 below). Outcomes have been weakest in Europe, where credit or operating costs (including misconduct costs) have remained elevated relative to revenues. Bank profitability has declined noticeably in some EMEs more recently, as economic growth has slowed and loan quality deteriorated.

4. Implications for the stability of the banking sector

This chapter assesses the implications of post-crisis changes in bank structure and performance for the stability of the sector. Key trends identified in Chapter 3 are supplemented with other information important for assessing the stability of the banking sector.

The discussion of banking sector stability is organised as follows. First, banks' resilience is considered, drawing on their progress in building regulatory buffers and stress test results. The second section appraises key changes in banks' risk management based largely on feedback from supervisors. The third section reviews market indicators to gauge trends in investor sentiment towards banks. The fourth section examines the capacity of banks to generate profits under a number of scenarios, given that accumulation of retained earnings is critical to their future provision of intermediation activities and their resilience. The chapter then takes a system-wide perspective of bank risk and resilience, including assessments of changes in market structure, interconnectedness, risk correlations and international banking. The final section concludes with an overall assessment of the implications for banking stability.

4.1 Bank risk buffers and risk-taking

The crisis revealed that many banks were not maintaining adequate capital and liquidity buffers to cope with stressed macro-financial conditions, let alone the excessive financial risks that some advanced economy banks had taken on.

In response to regulatory requirements, the banking sector globally has enhanced its resilience to adverse shocks through a substantial strengthening of capital positions. The process of adjustment to existing Basel III capital standards is mostly complete. As at end-2016, all large banks in the BCBS's global monitoring sample met their "fully phased-in" Basel III target CET1 regulatory capital ratios, including their G-SIB ratio surcharge where relevant (Graph 16, left-hand panel).[36] Moreover, large banks' CET1 capital was 70% higher relative to aggregate risk-weighted assets (measured on a fully phased-in basis) than in mid-2011 (and, within this, 80% higher for G-SIBs).[37] All large banks also met the minimum Basel III Tier 1 leverage ratio requirement at end-2016, with Tier 1 capital about 65% higher relative to aggregate unweighted exposures than in 2011 (Graph 16, centre panel).

Banks' buffers against short-term liquidity shocks have also been considerably strengthened due to the phase-in of new regulatory liquidity requirements. As at end-2016, the weighted average LCR was around 130%, with more than 90% of large banks (and all G-SIBs) having a fully-phased in LCR of at least 100% – the minimum regulatory requirement – up from 70% in 2012 (Graph 16, right-hand panel). An LCR of 100% or more indicates that a bank has enough liquid assets to withstand its expected net cash outflows within a 30-day period of stress.

There are also indications of a reduction in risk on both sides of advanced economy banks' balance sheets: many large banks have reduced their proportion of complex assets and assets (or borrowers) that typically pose more risk, while there has been a widespread shift away from short-term wholesale funding towards more stable funding sources. A reduction in the risk profile of banks' balance sheets means that,

Large banks' fully phased-in Basel II regulatory ratios[1]

In per cent   Graph 16

| CET1 | Leverage ratio | Share of banks meeting minimum LCR and NFSR |

CET1 —⌐ CET1   ▮ Min-max range
Leverage ratio —⌐ Leverage ratio   ▮ Min-max range
—— LCR   —— NSFR
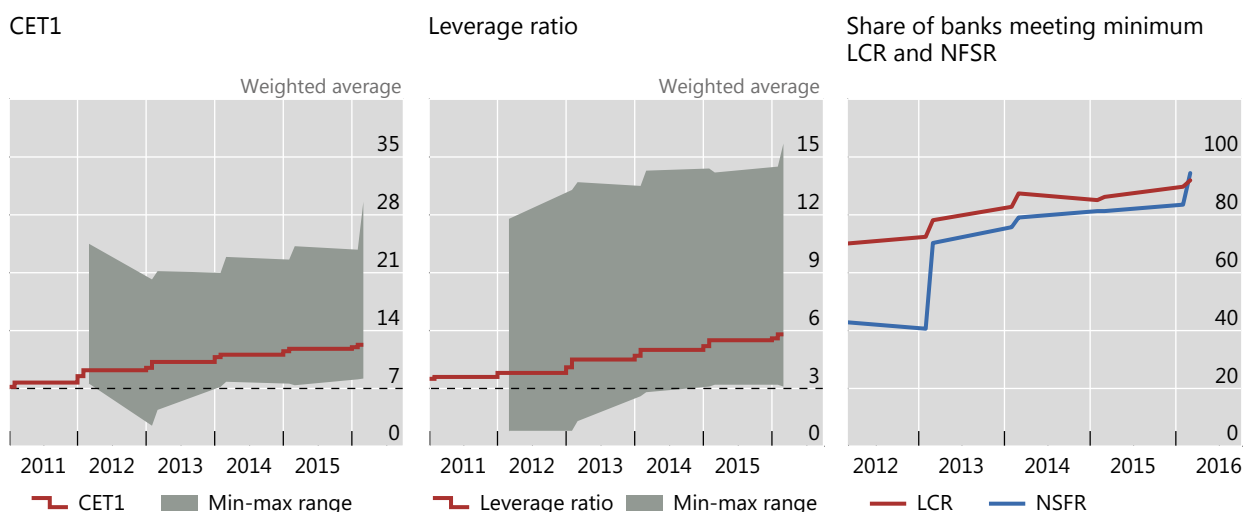
[1] Consistent sample of approximately 90 large banks, including G-SIBs. Dashed lines represent the minimum regulatory requirement for the CET1 ratio (including the capital conservation buffer) and the leverage ratio.

Source: Basel Committee on Banking Supervision.

[36]   Fully phased-in ratios are based on the full implementation of stricter capital standards, whether or not that is the case in practice. For further details, see BCBS (2017).

[37]   The (larger) increase in CET1 compared with banks' pre-crisis balance sheets cannot be quantified because fully phased-in risk-weighted assets under Basel III are not available before 2011.

Average bank common equity capital positions in stress test

In per cent Table 2

Stress test year	United States		European Union		United Kingdom	
	Starting	Stressed	Starting	Stressed	Starting	Stressed
2009	5.5	4				
2011			8.9	7.7		
2012	10.1	6.2				
2013	11.1	7.4				
2014	11.5	6.6	11.1	8.5		
2015	11.9	7.1				
2016	12.3	7.1	13.2	9.4	12.6	8.8
2017	12.5	7.2				

[1] These results should be viewed as indicative trends given that there are important differences between these stress tests (eg projection horizon) and related disclosures (eg minimum vs ending capital), and because there have been changes over time in the severity of the tests, in applicable capital rules, and in the population of tested banks.

Sources: Bank of England, European Banking Authority, Federal Reserve

for a given adverse shock, banks will need to draw less on their capital and liquidity buffers. However, the assessment of bank risk is complicated by uncertainty about banks' activities and the macroeconomic and competitive environment in which banks operate. Moreover, whether the observed changes represent a lasting adjustment in bank risk will also depend on the incentives banks face, as well as their risk management (see discussion in Section 4.2 below).

The shift to more stable funding sources is evident in banks' NSFRs – an indicator of the degree to which banks maintain a stable funding structure for their exposures. As at end-2016, the weighted average Net Stable Funding Ratio (NSFR) for large banks was around 115%, with about 95% of large banks (and all G-SIBs) meeting the fully phased-in minimum NSFR requirement of 100%, up from 43% in 2012.

Since the crisis, bank stress tests have become an increasingly important way for the supervisory community (and banks themselves) to assess banks' resilience to adverse conditions and ensure that they have adequate resources to continue supporting the real economy throughout the credit cycle.[38] Supervisors are also using these tests to drive risk and capital management practices, as well as support market and stakeholder confidence in banks.[39] These tests tend to be forward-looking, scenario-based and integrated into overall supervisory processes, although there are important differences across jurisdictions.[40]

Recent stress test results indicate that projected capital levels under severe stress scenarios have remained above regulatory minimums (Table 2). These stressed capital

[38] Some central banks are also using stress tests to assess the sustainability of banks' business models in adverse environments. For example, the Bank of England introduced an exploratory scenario into its stress testing to consider how the UK banking system might evolve if recent headwinds to bank profitability persisted or intensified over a seven-year horizon.

[39] For example, see Tarullo (2016) and Enria (2017).

[40] For a comparison of selected bank stress testing frameworks, see Dent and Westwood (2016).

levels exceed capital positions that banks were maintaining prior to the crisis-related losses (see Graph 10, left-hand panel).[41]

4.2 Bank risk governance and management

Inadequate governance and risk management were apparent in poor risk outcomes at many banks during the crisis.[42] They are also evident in the frequency and severity of bank conduct risk instances and associated legal and reputational costs over recent years. The need for robust risk management has perhaps become even more crucial since the crisis: supervisory expectations and stakeholder scrutiny have risen, while complexity in some aspects of risk management has grown – for example, in relation to model risk and cybersecurity.

Yet how banks take, measure and control risks tends to be much harder to observe than some other aspects of banking. The Group therefore reached out to bank supervisors in member jurisdictions to obtain information on banks' risk management. Supervisors from 12 jurisdictions provided information on the set of issues below. This information has been supplemented with several other official and private sector studies.

In sum, banks appear to have improved their risk governance and risk management practices since the crisis, although further progress is often needed to meet supervisory expectations. It can be difficult to disentangle the drivers of improvements: while many reflect regulatory and supervisory changes, banks have also been adjusting as a result of their crisis experience and market pressure.

Bank risk appetite.[43] Bank-wide risk appetite has declined significantly in countries that were more affected by the crisis or where credit conditions have deteriorated recently, whereas there has been a modest reduction or no change in other countries. Adjustments have been more pronounced for liquidity risk, an area where bank and regulatory frameworks were far less developed before the crisis. Several supervisors noted that shifts in risk appetite are more apparent in investment banking than commercial banking, as well as for activities that could entail a higher chance of conduct or compliance risk, in particular those with a cross-border element.

Risk governance and management structures. Many banks have been enhancing their risk appetite frameworks in response to supervisory focus. This process has involved broadening their risk metrics, including for liquidity risk, stressed events and, more recently, operational and reputational risks. Boards are also better

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[41]   According to Nouy (2017), applying the capital depletion for 26 euro area banks under the 2016 stress test to these banks' 2007 Tier 1 capital position yields an average Tier 1 ratio of 3.3% (indicating the average bank would fall below minimum regulatory ratios), while three banks' capital base was completely wiped out.

[42]   In the immediate aftermath of the crisis, the Senior Supervisors Group (2008 and 2009) reported that key firm-wide risk management practices – risk identification, valuations, balance sheet management, and risk measurement and reporting – helped to differentiate better and weaker performing banks during the crisis. Ellul and Yerramilli (2013) provide empirical evidence that the strength and independence of risk management functions at US banks is associated with better risk outcomes.

[43]   Risk appetite is a broad concept that can encompass various targets set by bank boards. The target metrics used will differ across banks but are likely to include some of the following: regulatory capital ratios, liquidity and funding indicators, exposure or concentration limits, VaR and stress test results.

integrating risk into their strategic and capital planning. Even so, some supervisors indicated shortcomings in the alignment of risk appetite with bank business models, as well as the degree to which banks cover all risk dimensions and embed their approach to risk across business units.[44]

Risk management expertise on boards has increased as the focus on risk has grown. The chief risk officer role has become more prominent and has direct and regular access to the board, which was not always the case prior to the crisis. However, some supervisors noted a need for additional independent directors, and there remains concern as to whether boards have sufficient expertise to effectively digest, debate and challenge technical risk information.

Risk and compliance functions have become more important in terms of their budget and staffing, and through their influence on decisions – for example, some supervisors have observed more evidence of new investment proposals being successfully challenged by risk staff. Supervisors also noted enhancements to policies and procedures for risk and compliance issues, and the establishment of more specialised risk committees. Banks have made front-line staff more responsible for risk under the "three lines of defence" risk management model, such as by clarifying responsibilities, establishing control units in the front line and increasing training.

Another development is the greater attention given to "risk culture".[45] Firms are recognising the need to incorporate culture in their firm-wide planning and for the CEO and CRO to influence culture through their communication and their actions. Other strategies include the development of industry-wide codes of conduct, and the consideration of cultural issues in recruitment and training. Banks are looking to better understand and measure their culture through staff surveys and audits, and specific dashboards.[46] In a private sector survey, most banks acknowledge that enhancing organisational and risk culture remains a work in progress.[47]

Risk management information systems. Banks have increased the frequency and quantity of risk reporting for the board and senior officers. They have also been upgrading their reports through greater automation and standardisation, and increasing the granularity of information for specific business groups or risks. Systems that feed into regulatory processes – for example, liquidity metrics, stress testing and VaR models – have tended to be prioritised. Nonetheless, supervisors emphasised that important gaps remain in banks' risk data capabilities. Indeed, in March 2017 the Basel Committee on Banking Supervision (BCBS) concluded that G-SIBs had unsatisfactory compliance with its principles for effective risk data aggregation and risk reporting, which were issued in 2013.[48] Banks have faced challenges on several

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[44]   For example, see ECB (2016b). In a survey of 67 large banks across 29 countries, more than half of respondents indicated some difficulty moving their firm-wide risk appetite approach further into the business (Ernst and Young (2015)).

[45]   Risk culture should be distinguished from the broader concept of non-financial risk. Risk culture can be considered as "the norms and traditions of behavior of individuals and of groups within an organization that determine the way in which they identify, understand, discuss, and act on the risks the organization confronts and the risks it takes" (International Institute of Finance (2009)).

[46]   For example, see APRA (2016).

[47]   Ernst and Young (2015).

[48]   See BCBS (2017).

fronts, including the management of information technology and data projects, implementation of firm-wide data policies and weakness in data quality controls.

Compensation and other incentives. In the post-crisis period, the proportion of remuneration that is variable has fallen. The share subject to deferrals and clawbacks has also risen for senior officers and material risk-taking staff. Risk now has a greater weight in ex ante remuneration decisions and is better reflected in internal capital pricing mechanisms (thus affecting pay outcomes through altered business unit profitability).[49] Measures to increase the accountability of senior executives and boards have also been introduced by some authorities.[50]

4.3 Market-based indicators of banks

Market-based indicators are often used to assess bank performance and risk. Specifically, market-based indicators give insight into market participants' perception of an individual bank's solvency and risk of failure, adequacy and riskiness of returns, and correlation with other (listed) banks. Market indicators can provide a useful complement to accounting-based metrics and are more timely. However, they are not without limitations as indicators of bank risk.[51] Moreover, market-based indicators provide only limited information about systemic risk, and they are not representative for banking systems with a high share of non-publicly traded firms.

Debt and equity market indicators

Spreads on credit default swaps (CDS) represent the cost of protecting against a loss on the debt securities that they reference. Bank CDS spreads have fallen significantly from the highs seen during the 2007–09 crisis and the subsequent 2011–12 euro area sovereign debt crisis, both in absolute terms and relative to the broader CDS market (see Graph 1, right-hand panel). The distribution of spreads across G-SIBs has also narrowed. These trends signal a marked reduction in market participants' perception of bank credit risk. While bank CDS spreads remain above those of the pre-crisis period, this result can be largely attributed to a change in investor attitudes to risk and presumably greater risk of bail-in from regulatory reforms (see below). Bank credit risk was underpriced by investors prior to the crisis, with CDS spreads for some banks not discernibly different from those of highly rated sovereigns during that time.

Whereas bank CDS pricing has improved over the post-crisis period, equity prices for some banks have remained depressed (see Graph 1, left-hand panel). Attention has focused mostly on the low level of equity prices compared with book valuations

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[49]   Nonetheless, a survey of more than 30,000 employees at seven major Australian and Canadian banks found that, from a risk perspective, remuneration structures are viewed significantly less favourably than are risk frameworks, managers and training (Griffin and Sheedy (2017)).

[50]   For example, in the United Kingdom, a Senior Manager Regime was introduced in 2016. Under this regime senior managers can be held accountable if they fail to take reasonable steps (including training or ensuring proper oversight) to prevent regulatory breaches in their areas of responsibility.

[51]   Security prices refer to a specific claim on the cash flows (or assets) of a firm, and thus reflect not only firm-wide risk but also the distribution of claims within the capital structure. This issue is highly pertinent for banks because of their leveraged nature and the changes to banks' capital structure arising from post-crisis regulatory reforms. Furthermore, markets can misprice claims for periods of time, with opacity of bank balance sheets perhaps making this more likely than for some other firms.

– that is, price-to-book (P/B) ratios, a common equity valuation metric. For some banks in Europe, Japan and, to a lesser extent, the United States, P/B ratios have been persistently below one, whereas values of more than two were common prior to the crisis (Graph 17, left-hand panel). Over recent years, P/B ratios have tended to be lower for G-SIBs relative to other large banks (Graph 17, right-hand panel). Discussions with equity market analysts indicate that valuations of some G-SIBs are below those of simpler banks that are achieving broadly comparable returns in the same home jurisdictions, and are also below those that would be implied from valuing some G-SIBs' individual businesses separately.[52]

Price-to-book ratios[1]

Graph 17

By region[2]

G-SIBs and non-GSIBs

United States   Other advanced[3]   EMEs[4]
Japan   Europe

G-SIB   Non-G-SIB
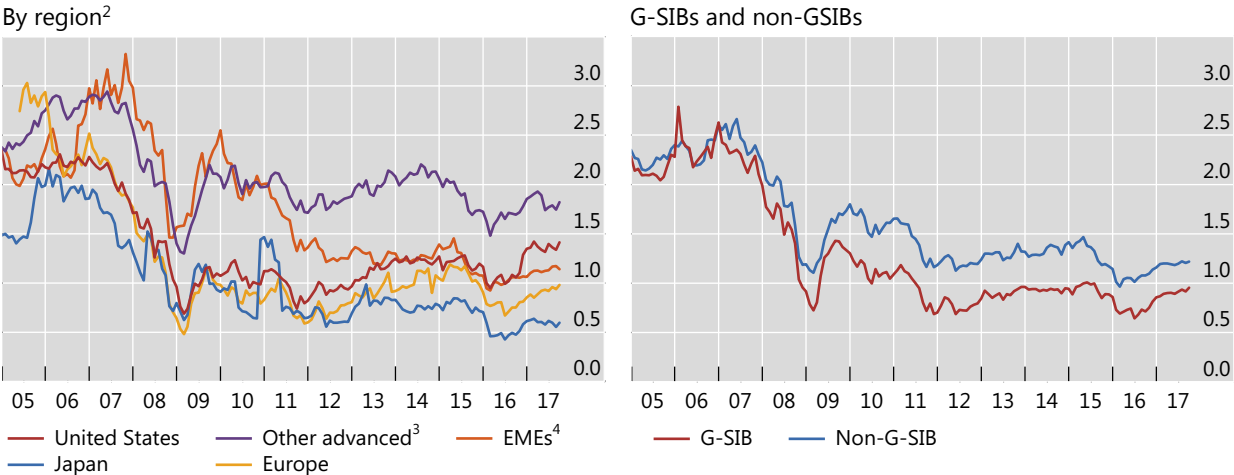
[1] Simple averages across the sample.   [2] Based on the sample of individual advanced economy and EME banks in Annex 2, subject to data availability.   [3] Australia and Canada.   [4] Brazil, China, Chinese Taipei, Hong Kong SAR, India, Israel, Korea, Malaysia, Mexico, Qatar, Russia, Saudi Arabia, Singapore, South Africa, Turkey and Venezuela.

Source: SNL.

P/B ratios of less than one imply destruction of bank net asset value in the future. Put differently, returns on these banks' equity are expected to be below those demanded by investors – that is, their cost of equity. In fact, actual returns on equity for some large banks in Europe and the United States have been significantly below their estimated cost of equity over recent years (Graph 18, left-hand and centre panels). Current depressed P/B ratios signal that markets anticipate a continuation of inadequate returns for (at least some) banks in the period ahead. Consistent with this view, Sarin and Summers (2016) argue that the marked reduction in P/B ratios is symptomatic of a decline in the franchise value of banks (ie the ability of banks to generate profits in the future). Similarly, across advanced economy banks there is a close correlation between P/B ratios and expected future returns on equity (Graph 18, right-hand panel). Moreover, a high share of firms with relatively weak expected returns trade below book value.

Cost of equity can be considered an indicator of risk, since equity investors should demand higher returns for more risky claims. Estimated cost of equity for

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[52]   A valuation discount for financial conglomerates had been established empirically prior to the crisis (Laeven and Levine (2007)).

banks has declined from the heights observed at the peak of the crisis, and are at broadly similar levels than in the pre-crisis period, as a substantial fall in risk-free rates has been offset by much higher bank equity betas (see Annex 4 for the estimation methodology).[53] Bank risk premia are higher despite the apparent reduction in risk-taking noted above, and are likely to partly reflect investors' reassessment of the riskiness of banks (as observed for CDS spreads), as well as greater volatility (risk) in bank earnings because of a confluence of bank-specific and other factors.[54] It could also be due to uncertainty about capital actions for some banks, as any new equity issuance would dilute existing investors' claim on future earnings. Weak valuations may also highlight investors' view that some banks' efforts to restructure and alter their business models remain a work in progress. Another possible explanation is the diminution of implicit government subsidies due to revised bank resolution regimes.[55] This latter issue is discussed below.

Bank return on equity and equity market pricing

Graph 18

Cost-of-equity and actual return on equity

Cost-of-equity and actual return on equity

Banks' price-to-book ratios and projected return on equity[2]

$y = 3.43 + 4.7x$
where $R^2 = 0.8$

Cost of equity:[1]
- Japan
- Europe

RoE:
- Japan
- Europe

Cost of equity:[1]
- United States
- Other AEs

RoE:
- United States
- Other AEs

- United States
- Europe
- Japan
- Other[3]
- Linear (trend line)
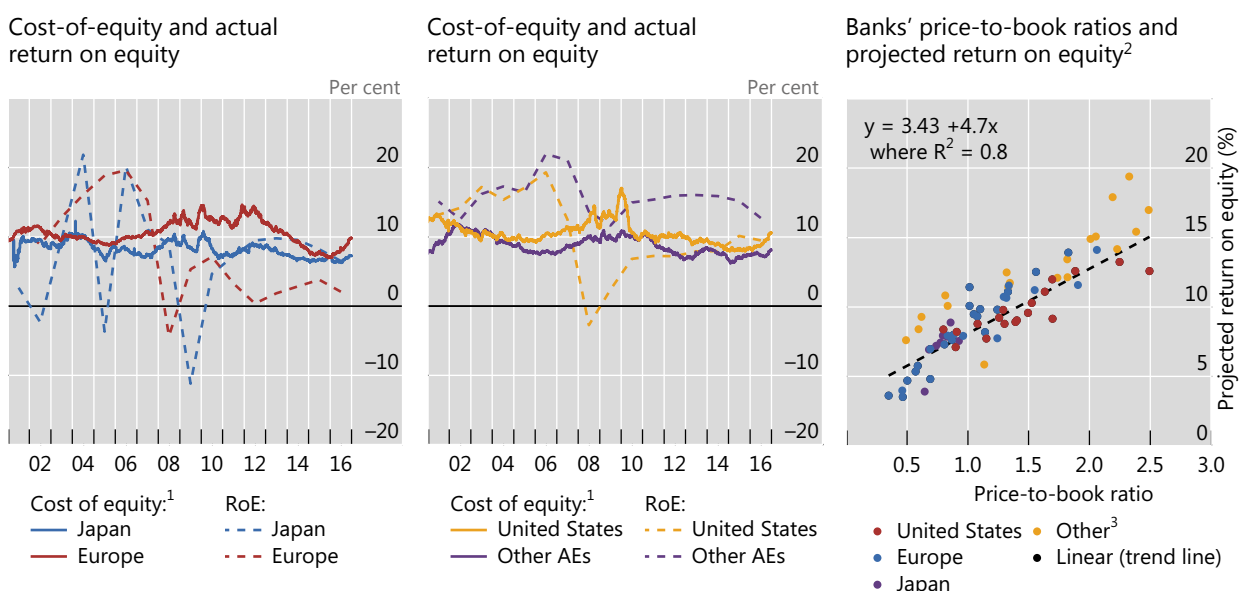
[1] Derived from a variant of the capital asset pricing model; see Annex 4 for estimation methodology.   [2] Price-to-book ratio calculated as the average share price for 2017 to date, divided by the average book value of equity for 2015 and 2016. Projected return on equity (ROE) is for 2018.   [3] Australia, Canada, Hong Kong SAR, Korea and Singapore.

Sources: Bloomberg; Capital IQ; Datastream; Fitch Connect; SNL; Thomson Reuters; BIS calculations.

Indicators of market perceptions of government support for banks

Post-crisis reforms to bank crisis management and resolution frameworks have sought to allow banks to be recovered or resolved in an orderly manner without reliance on

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[53] Cost of equity estimates should be interpreted with caution. The cost of equity is an unobservable metric, with numerous estimation approaches.

[54] Moreover, Baker and Wurgler (2015) note that higher capital requirements may raise the cost of capital for banks because of the low risk anomaly (within the stock market, historical returns and thus realised costs of equity are higher, not lower, for less risky equity).

[55] Although implicit government guarantees should benefit debt investors more than they do equity investors, Kelly et al (2016) find evidence that they affect stock prices.

government support. In doing so, competitive and financial stability distortions arising from market perceptions of implicit government guarantees can be reduced.

Perceptions of government support can be inferred from market prices. Contingent claims analysis allows the calculation of historical market-implied expected losses on banks' debt – in effect, contingent liabilities of the government – based on the assumption that equity prices are less sensitive to changes in perceived government guarantees than CDS prices because equity holders are less likely to

Market perception of government support for G-SIBs

Graph 19

Contingent claims on government[1]

Rating grade difference between junior debt and senior debt[2]

Difference in CDS spreads of junior and senior bonds
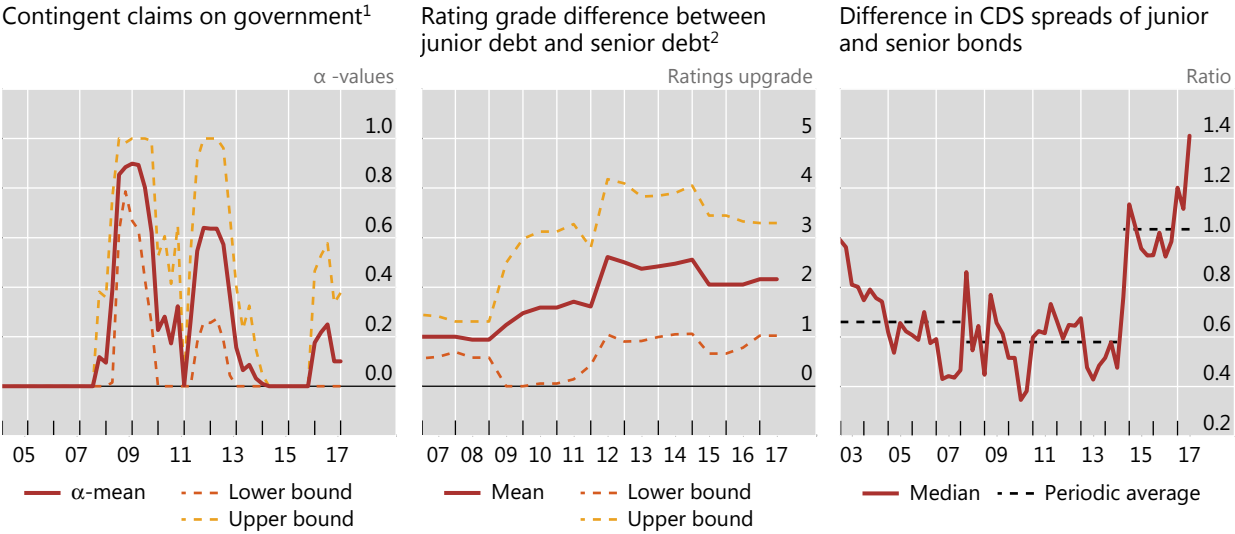
[1] Alpha values are the fraction of bank losses that might become contingent government liabilities. A value of 1 implies full government support of bank debt. [2] Moody's credit ratings. Lower and upper bound are one standard deviation from the mean.

Sources: Bloomberg; Moody's Investors Service.

benefit from any such support.[56] "Alpha" values for a sample of G-SIBs are shown in Graph 19 (left-hand panel), where alpha is the fraction of bank losses that might become contingent government liabilities, varying from 0 for no government support to 1 for full government support of bank debt. Variation in alphas should be interpreted with care, as low values can be either signal that no government support is expected or that bank is considered safe and no support is expected to be necessary. The values show substantial public sector support during the financial crisis and euro area sovereign crisis and a smaller peak during the turbulence in early 2016, but an overall reduction in implied support over recent years.

Changes in perceptions of government support may also be inferred from differential market assessments of junior and senior bank debt, since junior debt is lower in the capital structure and thus more affected by revised resolution regimes. The gap between credit ratings for G-SIBs' junior and senior debt has widened since the crisis, on average by one rating grade, but in some cases by two notches

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[56] Expected losses are inferred from CDS prices. In the case of equity, expected losses are considered as the price of a put option written on assets, where the present value of debt is the strike price and the value and volatility of assets determined by changes in the equity and equity options prices of the bank. See Jobst and Gray (2013).

(Graph 19, centre panel). This suggests that a re-assessment of assumed government support has more significantly affected the credit ratings of G-SIBs' junior debt.[57]

The increase in perceived risk differentiation between junior and senior debt is also observable in the CDS market. Market pricing of CDS spreads for G-SIBs' junior debt have also widened relative to those for senior debt in recent years (Graph 19, right-hand panel). This widening appears to be a response to new terms introduced in 2014 by the International Swaps and Derivatives Association, which included the incorporation of government-initiated bail-in terms. This suggests that the CDS market has begun to price in a higher expected loss arising from bail-in events.

4.4 Future profitability and resilience of banks

The capacity of banks to generate profits and accumulate capital through retained earnings is critical to their future provision of intermediation activities and their resilience. It is also important for access to external capital through equity markets. Indeed, the above analysis suggests that low equity market sentiment for some banks primarily relates to concerns over future profitability. Accordingly, this section considers the profit outlook for individual banks using a scenario analysis. This analysis is preceded by a decomposition of changes in post-crisis profitability. RoE is the profit measure used because of its importance to investors and its widespread use in banks' own capital allocation.

As noted earlier in the report, banking sector RoE has declined across regions and countries, as well as business model types. Within our sample of large banks, most reported an RoE in 2015–16 which was significantly below that of a decade earlier. Around 60% of banks had a RoE below 10%, a rough marker for banks' cost of equity (Graph 20, left-hand panel).[58] The share is higher within the subset of advanced economy banks, at 78%.

A DuPont analysis allows trends underlying the decline in bank RoE to be better pinpointed. The analysis breaks down RoE into effects from financial leverage (assets/equity), asset yield (revenue/assets) and profit margin (net profit/revenue), with the latter two ratios being a decomposition of RoA. Lower leverage accounts for almost half of the post-crisis decline in bank RoE (Table 3). It has pressured RoE in all regions and for all business model types, most significantly trading banks, which were maintaining higher leverage prior to the crisis. Profit margins have also generally been eroded, with many European banks underperforming due to high credit or operating expenses (including misconduct-related litigation costs). The RoE contribution from asset revenue has fallen for most, but not all, regions and business model types, with

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[57] In addition, Haldane (2017) shows for major UK banks a reduction in the uplift in senior debt ratings as a result of lesser assumed government support.

[58] Cost of equity estimates for advanced economy banks are shown in Section 4.3. For illustrative purposes, we use a 10% assumption. Given that the cost of equity should depend on a bank's business model and risk, it is possible that for some banks investors would be willing to accept materially lower returns over the medium term, particularly in an environment of relatively low interest rates. That said, in Ernst and Young (2016), 57% of large banks surveyed (and 74% of G-SIBs) indicated that they are seeking to achieve target RoEs of 10–15% in the next three years. Furthermore, around 70% of EU bank respondents indicated a long-term sustainable RoE of 10% or more.

pressures more acute for (retail) banks in Japan (also see Box C). Nonetheless, the overall impact from asset yields is less than for the other components.

A scenario analysis can be used to illustrate the range of potential RoE outcomes. The first scenario assumes that banks benefit from a more favourable cyclical backdrop, increasing revenue and lowering credit costs to values close to the best outcomes in their historical experience.[59] Under optimistic assumptions, average advanced economy bank RoE improves to 13%, yet around one quarter of banks post returns below 10% and a small share of banks incurs a loss (Graph 20, centre panel). European banks face the greatest challenges, showing a lower median and accounting for all banks in the sample that post losses under the scenarios.

A second analysis assumes that banks' operating efficiency adjusts to near-best outcomes in their historical experience.[60] While average advanced economy bank ROE improves under this scenario, slightly more than half of the distribution remains below 10%, suggesting that, without other meaningful improvements, banks would need to improve their cost efficiency beyond levels seen in the past.

The results suggest that, across the global banking sector, the achievement of returns that meet the estimated cost of equity will require a combination of favourable cyclical developments and substantial improvements in cost efficiency, particularly among European banks. Progress on efficiency may require that banks

DuPont analysis of bank profitability

Simple average, in per cent   Table 3

	2015–16	Change 2005–06 to 2015–16			
	Return on equity	Return on equity	Financial leverage	Asset yield	Profit margin
All banks	8	–7	–3	–1	–3
Of which, by region:					
Euro area	3	–10	–3	0	–7
Other Europe	6	–11	–4	–1	–6
United States	9	–7	–4	–2	–2
Other advanced	12	–4	–2	–3	0
EMEs	12	–3	–3	0	0
Of which, by business model:					
Retail-funded	6	–9	–2	–2	–6
Wholesale-funded	8	–6	–2	–2	–2
Universal	9	–6	–4	0	–2
Trading	9	–5	–5	1	–1

Source: SNL.

[59] The analysis adjusts current ratios of net interest income and non-interest income per asset to the 90th percentiles in their historical distribution since 2005. Credit costs per revenue are adjusted to the 10th percentile of their distribution. Net profit margins are assumed to rise to account for positive operating leverage in a revenue growth scenario. Balance sheet size and mix are assumed to be static.

[60] The analysis adjusts current ratios of operating costs per revenue to the 10th percentiles in their historical distribution since 2005. Balance sheet size and mix are assumed to be static.
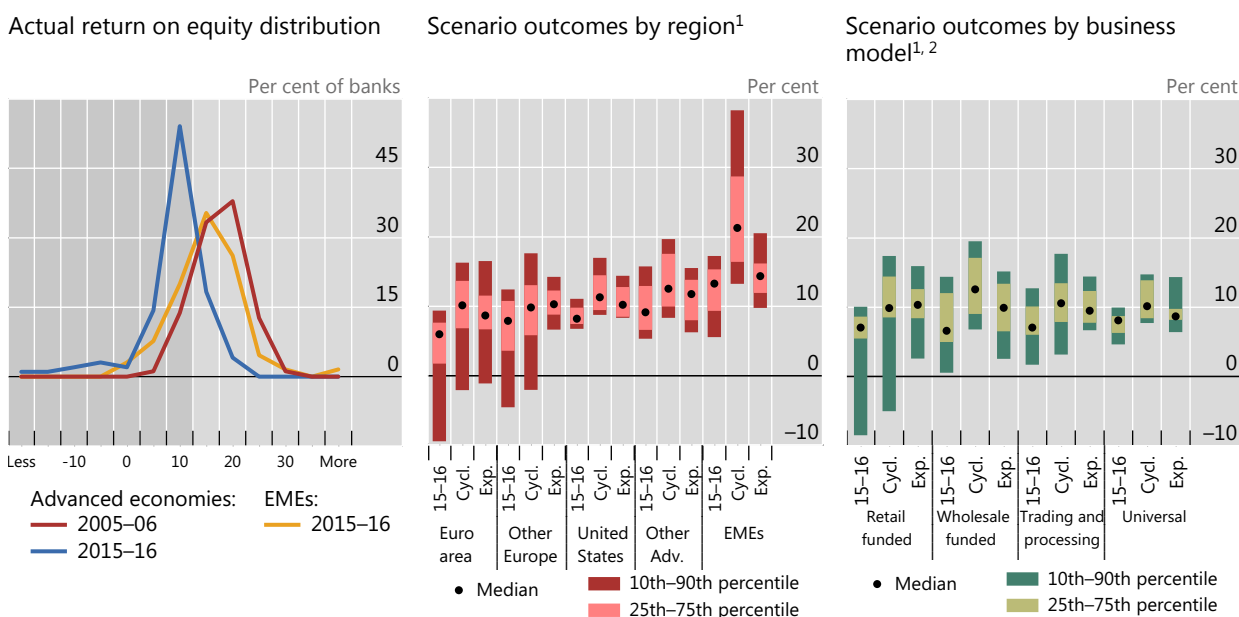
Actual return on equity distribution	Scenario outcomes by region[1]	Scenario outcomes by business model[1, 2]

Advanced economies:
— 2005–06
— 2015–16

EMEs:
— 2015–16

● Median   ■ 10th–90th percentile
                  ■ 25th–75th percentile

● Median   ■ 10th–90th percentile
                  ■ 25th–75th percentile

[1] Based on the sample of individual advanced economy and EME banks in Annex 2, subject to data availability.   [2] For each region and business model, actual return on equity in 2015-16 and under projected, cyclical and operating expense scenarios.

Source: SNL.

re-evaluate their cost structures more broadly. It is possible that this process could be supported by rapid digital technological progress, which, as noted above, could provide banks with a unique opportunity to compress their operating cost base. Lastly, banks could seek to bring down the RoE required by investors, such as by making their business model less opaque and easier to value. Over time, investors in banks may also have to adjust their expectations, taking into account the effect of structural changes that reduce the risk embedded in banks' shares.

4.5 Banking system-level risk and resilience

This section considers banking stability from a system-wide perspective. The stability of banking systems depends not only on individual banks' resilience and risk-taking, but also the properties of the system. This includes the structure of banks within the system and the potential for distress to propagate across banks, either through direct contractual linkages or indirectly through fire sale externalities, information contagion and/or common exposures. The section of the report focuses on the impact of changes in market structure, banking interconnections, risk correlations and international banking.

Market structure

The analysis in Chapter 3 showed that there has been a reduction in the capacity of many banking systems in Europe, as reflected in a fall in system assets and the number of banks, as well as in a decline in bank branch and employee numbers. Although cost-to-income ratios have generally not yet improved, lowering the cost base of the banking sector in absolute terms can be considered a positive development for banking stability insofar as it improves future profitability and competitive dynamics.

Another aspect of change in market structure is a tendency for higher concentration in some banking systems, although there are some exceptions to this trend as well as significant dispersion in concentration across countries. A more concentrated system could have a positive effect on financial stability if bigger banks benefit more from risk diversification and economies of scale, or derive higher profitability and franchise value from greater pricing power. On the other hand, as noted above, large banks can pose "too-big-to-fail" risks, and they are more complex and difficult to monitor and, if need be, to resolve.

Across CGFS jurisdictions, there does not seem to be a clear relationship between banking system concentration and profitability (RoA) during the crisis or since, nor is there with operating efficiency since the crisis (Graph 21, left-hand and centre panels).[61] Moreover, bank concentration ratios do not take market contestability (ease of entry) into account, and thus do not provide a clear indication of competition in banking.[62] For these reasons, the Group does not draw financial stability conclusions from post-crisis shifts in banking system concentration. That said, future experience could differ from the past – for instance, fixed cost pressures on banks associated with technological deepening might raise the relative benefits of scale, all other things equal, while the costs associated with big banks might be significantly lowered by regulatory reforms, such as the above-noted measures to address systemically important banks.

Banking system concentration and performance

Graph 21

Return on average assets

y = 0.48 +0.0023x
where R^2 = 0.01

y = 0.31 +0.0054x
where R^2 = 0.04

Concentration ratio top 5 banks, %

● 2007–09   ● 2010–16

Cost-to-income ratio

y = 53.33 +0.0738x
where R^2 = 0.01

Concentration ratio top 5 banks, %

● 2010–16

Lerner index and Boone indicator[1]

Lerner index (lhs):
Boone indicator (rhs):

— Median
■ 25th–75th percentile
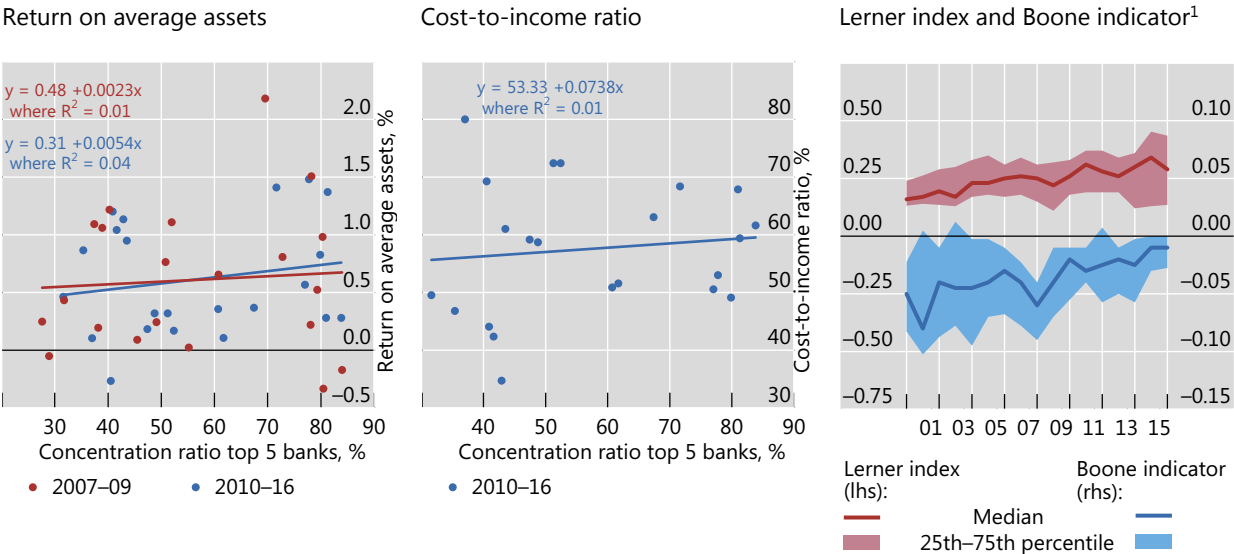
[1] The Lerner index is a measure of market power in the banking market. It is defined as the difference between output prices and marginal costs (relative to prices). The Boone indicator is a measure of degree of competition, calculated as the elasticity of profits to marginal costs. Both indices cover CGFS jurisdictions included in Graph 4, except for Australia, Belgium, euro area aggregate and India.

Sources: Bureau van Dijk; World Bank; Bankscope; national data.

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[61] These results are indicative. Banking system concentration ratios are on a domestic basis for nearly all countries, whereas return on asset and cost-income ratios are often on a global consolidated group basis. This inconsistency could alter relationships for those banking sectors that have significant foreign banking operations.

[62] For example, Claessens and Laeven (2004) find no evidence that banking system concentration is negatively related to competition.

Given the limitation of concentration ratios as indicators of banking system competition and risk, other measures that derive from microeconomic theory are often used. The Lerner index illustrates the ability of banks to charge a price above marginal cost, with higher values approaching 1 indicating greater market power.[63] The Boone Indicator measures the elasticity of profits to marginal costs, based on the notion that more efficient firms gain a higher market share of profit. More negative values indicate higher levels of competition and thus greater reallocation of profits to more efficient firms.[64] Both of these indicators suggest that competition has tended to decrease across CGFS jurisdictions since 2000 (Graph 21, right-hand panel). While the Lerner Index suggests that differences in the level of competition across countries have widened, the Boone indicator points to lower dispersion over time.

Correlation in banking systems

Broadly speaking, the analysis in Chapter 3 points to bank business models becoming somewhat more similar in the post-crisis period, with banks in advanced economies having generally shifted towards commercial banking, particularly more traditional retail banking business and deposit funding. While these broad changes may be considered positive for the safety of individual banks, at a system level there is the potential for a convergence in business models to result in risk correlations in the banking system. In principle, the risk outcomes of banks with common exposures or funding sources could become highly correlated: banks might behave in the same way in the same circumstances (eg sell certain assets at the same time) or be affected by the same shocks (eg investors in banks might withdraw funding for all banks in response to problems within the sector).[65]

Similar business strategies and models might also engender excess competition among banks, since banks are competing for the same customers. For example, two parallel studies on relatively homogenous regional banking sectors in Germany and Japan show that competition has been intensifying and is contributing to a greater vulnerability in these banks (Box C).

The Group did not investigate the degree of a convergence within and across countries from the perspective of common exposures and funding sources, which require very granular data. It rather considered two approaches that provide some general information on changes in risk correlations across G-SIBs. First, ΔCoVar, which is the difference between the value-at-risk of the financial system in its median (or typical) state and the value at risk of the financial system when a bank is in financial distress.[66] A higher value indicates the bank contributes more to the co-movement of risk in stress times. Second, correlations of bank default probabilities are derived from five-year CDS, adjusted for the default probabilities of each bank's home sovereign.[67] A higher value for this measure indicates that a bank's risk co-moves more with that of other banks. The ΔCoVaR measure shows that, after increasing sharply during the

[63]   Lerner (1934).

[64]   Boone et al (2005) and Boone (2008).

[65]   For example, see Wagner (2010).

[66]   Adrian and Brunnermeier (2016).

[67]   Based on the model of Abbassi et al (2017). The partial correlations across banks are the residuals of the regression on banks' default probabilities on default probabilities of their respective home countries.

crisis, covariance has declined over recent years to levels a bit above those seen prior to the crisis (Graph 22, left-hand panel). In contrast, the CDS measures show a reduction in bank correlation across countries over the post-crisis period (Graph 22, centre left-hand panel).

Another indicator of systemic risk is the vulnerability of banks to asset fire sales. For US bank holding companies, this vulnerability is measured as the system-wide losses resulting from an assumed 1% decline in the prices of all bank holding company assets.[68] At the peak of the crisis in 2008, such a decline in asset values would have caused an almost 30% fall in the aggregate equity of bank holding companies, whereas the current figure is much smaller, at around 10% because of lower leverage and "connectedness" among banks (Graph 22, centre right-hand panel).[69] US broker-dealers (not shown) have also seen a substantial decline in this measure of fire sale vulnerability since the crisis.

Risk correlations   Graph 22

ΔCoVar	Partial CDS correlation across countries[1]	US banks' fire sale losses	German banks' Systemic Liquidity Buffer[2]
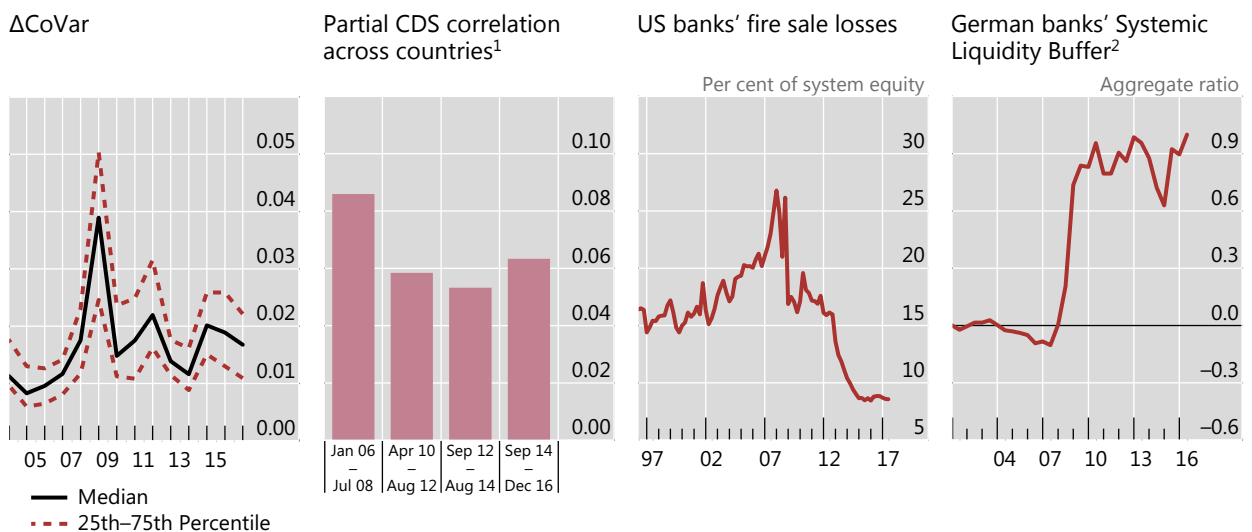
[1] The partial correlations across banks are the residuals of the regression on banks' default probabilities on default probabilities of their respective home countries.   [2] The Systemic Liquidity Buffer has a maximum value of 1 and a minimum value of −1.

Sources: Abbassi et al (2017); Adrian and Brunnermeier (2016); Duarte and Eisenbach (2013); Deutsche Bundesbank (2016).

An alternative indicator for the vulnerability of banks to asset fire sales is the Systemic Liquidity Buffer (SLB).[70] In this model fire sale losses result from a system-wide funding shock, where banks cannot roll over short-term debt and liquidate fungible assets to service their liabilities. A maturity structure with a higher share of

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[68]   Duarte and Eisenbach (2013).

[69]   Connectedness measures the illiquidity concentration of the system and depends on whether illiquid assets that are held by large and levered institutions are also widely held.

[70]   For further details see Deutsche Bundesbank (2016). The SLB measures the difference at the individual bank level between assets that can be sold at short notice (eg tradable bonds) and are valued at fire sale prices and the payment outflows from contractual obligations (such as deposits and interbank liabilities) as expected in the event of a systemic liquidity shock. The normalised SLB is standardised at the maximum amount of the SLB in the period under review, which means that its values are limited to fluctuations between −1 and 1.

short-term liabilities implies higher system-wide fire sale losses. Consistent with this, the aggregated SLB for the German banking system climbed sharply over the course of 2008, primarily because of a significant decline in short-term liabilities (Graph 22, right-hand panel). The positive values of the SLB after the crisis point to much more comfortable liquidity buffers.

Regional bank business model homogeneity and competition in Germany and Japan

Regional banks in Germany (saving banks and cooperative banks) and Japan (regional banks and shinkin banks) have highly homogenous business models. Compared with major banks, their profit sources are more concentrated on net interest income, with a focus on traditional lending activities to households and SMEs (Graph C.1, left-hand panel). As their financial intermediation services are relatively similar, customers can easily switch their business between regional banks. Under these circumstances, regional banks tend to face severe competition, especially on loan interest rates.

Competitive pressures have been building for regional banks. The prolonged low interest rate environment and intensified competition among bank branches providing similar financial intermediation services have depressed their net interest margin. In addition, subdued loan demand due to population ageing (as well as population decline in many areas of Japan) has also been putting downward pressure on banks' profits.

To gauge the severity of competition facing regional banks, mark-ups (price less marginal cost) are estimated.[1] According to microeconomic theory, the market power of a firm can be defined in terms of the price elasticity of demand for its outputs. Firms that have market power and maintain a competitive advantage can charge large mark-ups, while firms that have less market power and are exposed to severe competition can only charge smaller mark-ups. The results show that mark-ups have been declining over the long term, indicating that competition among regional banks in both Germany and Japan has been rising (Graph C.1, centre and right-hand panels). Additionally, the median (not shown) and mode have declined and the variance of mark-ups has shrunk, suggesting that financial intermediation services provided by regional banks have become less profitable and even more homogeneous.

To investigate the implications of these changes for banking stability, the relationship between individual regional banks' mark-ups and Z-Scores is examined. The Z-score is a measure of business risk, defined as the ratio of a bank's loss-absorbing capacity to the volatility of its profits – the lower the score, the less stable the bank's business is. The results indicate that mark-ups have a statistically significant explanatory power with regard to Z-scores in both countries. Moreover, estimated parameters indicate that the relationship between the mark-up and Z-score forms an inverted U-shape – Z-scores are smaller at relatively low and high mark-up values. In this distribution, most German and Japanese regional banks' mark-ups lie in the region where their business risk increases as a result of intensified competition. Overall, these results indicate that intensified competition among regional banks has reduced their margins, partly because of the highly homogeneous nature of their business models but also due to low interest rates. This situation may have the potential to negatively impact the resilience of regional banks in the long run.

The results are consistent with the theoretical literature which predicts that the effect of bank competition on bank risk-taking is non-linear, although other studies show that the empirical relationship between competition and (individual) bank risk highly depends on the chosen competition measure. For instance, studies applying the Lerner Index tend to indicate that a reduction in the pricing power of individual banks due to fiercer competition leads to increasing bank risk, whereas according to empirical analyses based on the Boone indicator a more competitive market environment is associated with a lower level of bank risk.[2]

Regional banks in Germany and Japan   Graph C.1

Revenue components

EUR bn / JPY trn

Bars: Major banks, Coop. banks, Savings banks, Major banks, Regional banks, Shinkin banks

- Net interest income
- Net fees and commissions
- Other

Distribution of mark-ups for Germany

Density

— 2000   — 2010
— 2005   — 2015

Distribution of mark-ups for Japan

Ratio of banks, %

Mark-up, in percentage points

— 1985   — 2005
— 1995   — 2015
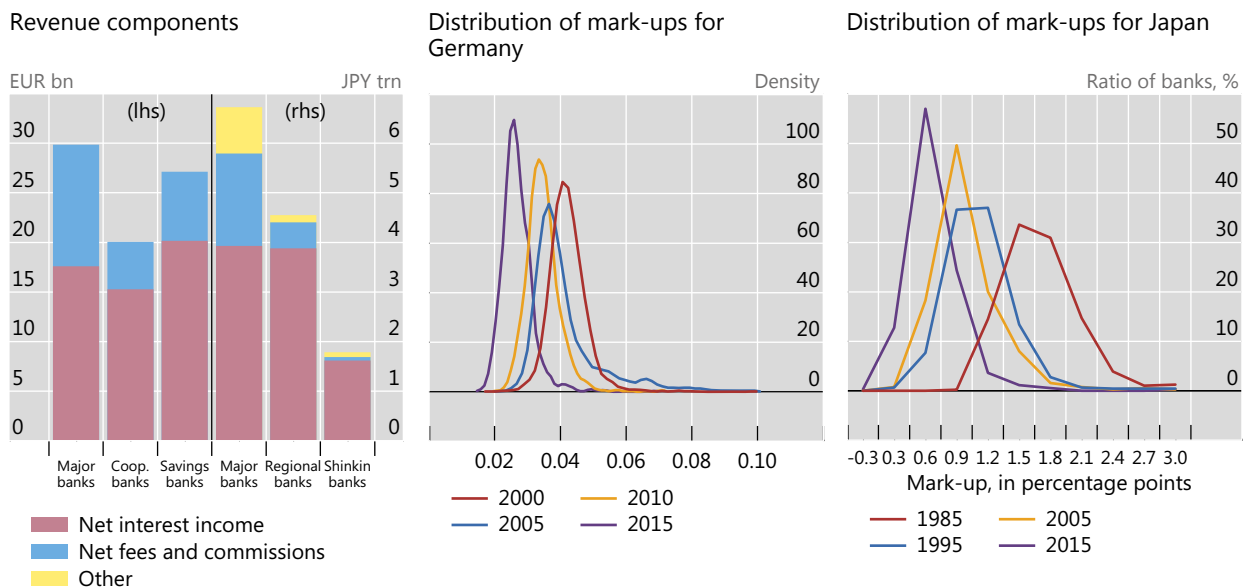
Sources: Deutsche Bundesbank; Bank of Japan.

① The ratio of operating income to total assets is used to represent the price (P) of individual banks' financial intermediation services. Marginal costs (MC) are calculated based on panel estimates of individual banks' cost function. For further details, see Bank of Japan (2017). In a low interest environment, mark-ups over prices (such as Lerner Index) have a methodological bias because the indicator will tend to rise as the denominator declines, even if there is no change in banks' market power. In order to avoid this bias, mark-ups could be used as an alternative measure of market power. ② See Martinez-Miera and Repullo (2010) for theoretical literature, and for relevant empirical studies Buch, Koch and Koetter (2013) and Kick and Pietro (2014).

Interconnectedness in banking systems

The crisis demonstrated that extensive direct financial connections between banks can be a source of systemic risk. Several changes point to a reduction in interbank connections since the crisis. First, as noted in Chapter 3, the use of interbank borrowing has declined across a number of advanced economies in association with the shift to deposit funding (although extraordinary monetary stimulus has played a part). Second, G-SIBs have lowered their notional OTC derivative exposures relative to the size of their balance sheets, with this change more pronounced for those with relatively high pre-crisis exposure. Third, over recent years an increasing share of OTC derivatives has been cleared with central counterparties, rather than bilaterally with other banks. Most notably, around 60% of interest rate derivatives were estimated to be centrally cleared in 2016, up from around 20% in 2008.[71]

The results from two simulation studies indicate a reduction in inter-connectedness in the German and Mexican banking systems, although they do not shed light on the underlying drivers of the reduction.

[71]   BIS (2017a).

The first study quantifies the reduction in aggregate banking system Tier 1 capital of the German banking system in response to an adverse shock (Graph 23, left-hand panel). The calculation is based on the entire network of German banks' domestic bilateral claims, which is constructed from the German credit register. The model separately measures the impact of a direct effect (write-downs on direct claims) and an indirect effect (expected loss provisions on interbank claims).[72] The estimated indirect effect stems from the impact on creditor banks' Tier 1 capital ratio of deterioration in the creditworthiness of its debtor banks.

The model indicates that losses from idiosyncratic bank defaults of German banks increased during the pre-crisis period, and reached a peak during the crisis in 2008. Afterwards, the reduction of interbank exposures lowered potential propagation effects. In addition, the steady improvement in capitalisation levels has made the large banks more resilient to shocks at other banks in the network.

Bank interconnectedness simulations

Graph 23

German simulation

Mexico simulation

Mexican banks' total exposure to foreign financial counterparties

Interbank exposures
Tier 1 capital
Banking system loss

Internationally triggered
Domestically triggered
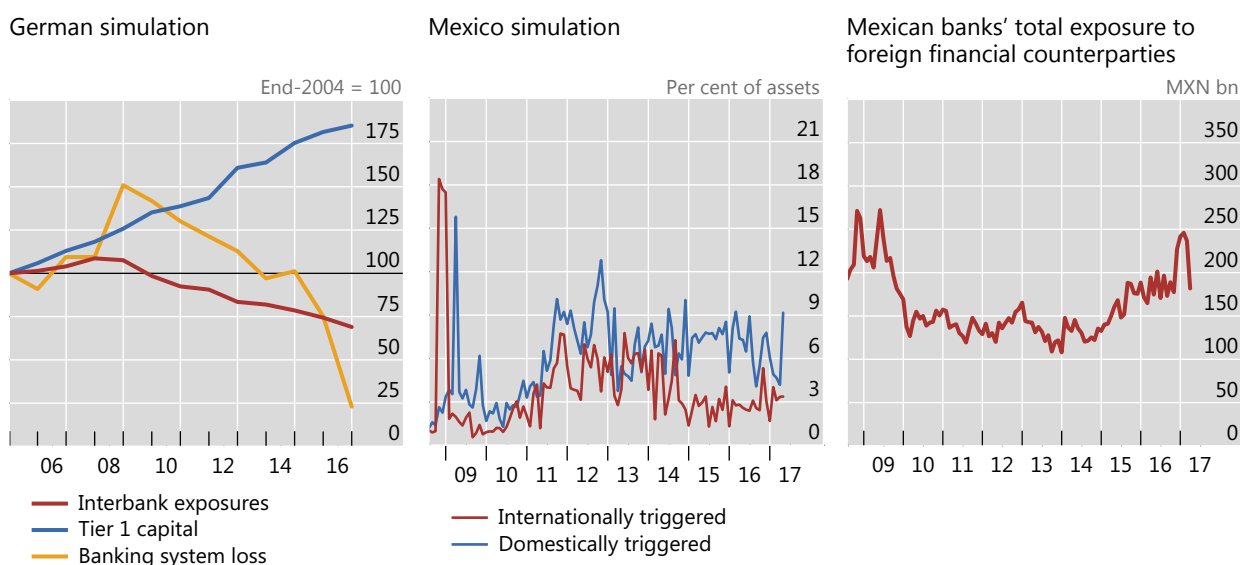
Sources: Fink et al (2016); Deutsche Bundesbank; Bank of Mexico.

The second study measures the total assets of failed banks (and broker-dealers) in Mexico resulting from a single failure of a domestic or foreign counterparty bank. The results show a reduction over the past few years in the "worst case" outcome for failed assets, as a percentage of total assets, from the failure of a foreign bank (Graph 23, centre panel). This reflects a reduction in the average size of individual links to foreign banks in the network, even though overall exposures have increased (Graph 23, right-hand panel).

[72]   For more information on the model, see Fink et al (2016).

International banking risk

Broadly speaking, the financial stability implications of changes in international banking integration will depend on trade-offs between risk-sharing and risk spillovers. Banking integration entails diversification of risk for home country banks and recipient countries, which could prove beneficial in the face of local shocks.[73] Operating internationally may also increase bank risk-adjusted returns through alternative (uncorrelated) income streams and funding sources. On the other hand, international bank diversification can transmit stress between countries.[74] The impact of foreign banking relationships on home and recipient economies is likely to be more significant where foreign bank exposures are large, or where interconnections between foreign bank affiliates (ie funding or legal links) are strong. For host economies, strong effects can arise if foreign banks provide critical services.

The post-crisis reduction in the international activity of some major advanced economy banks could generally be regarded as a positive development for both global and national financial stability. The weight of experience from the financial crisis was that large internationally active banks tended to generate adverse international risk spillovers rather than be a stabilising force. Most notably, cross-border bank lending proved far less stable than activity conducted locally (either by foreign or domestic banks). Foreign bank lending was also more prone to pullback when funded in wholesale markets (short-term interbank and foreign currency markets), as opposed to deposit or internal capital markets.[75] In a similar vein, several country case studies conducted under the International Banking Research Network (IBRN) found that, when faced with a liquidity shock, lending to foreign borrowers or by foreign bank branches was more resilient for those parent banks that made greater use of core deposit funding and equity capital.[76]

A cutback in the international presence of some global banks may also help to strengthen banks' balance sheets by improving their profitability, because the businesses exited tended to be small-scale or weakly performing. Indeed, some foreign banks made disproportionate losses in their international ventures over the past decade, including through traditional credit business or more complex structured assets, but also conduct issues. Such problems may suggest that international diversification involved information asymmetries or complexities that were not well managed, or more simply that foreign offices were subject to weaker risk management oversight than head office. As such, a reduction in the geographical spread of global banks might make them easier to manage and monitor.

Any reduction in long-term risk from international banks needs to be weighed against the potential for greater concentration in, or lower availability of, cross-border and other foreign banking services, if only in the short term (see Section 5.1 below).

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[73] For example, by drawing on parent funding, foreign banks might be able to play a stabilising role during times of stress in host economies (Crystal et al (2002); De Haas and Lelyveld (2010)).

[74] For example, see Peek and Rosengren (1997).

[75] See De Haas and van Horen (2013), De Haas and Lelyveld (2014), Reinhardt and Riddiough (2015), McGuire and von Peter (2016).

[76] Buch and Goldberg (2015). A similar result is also found in Avdjiev et al (2017).

These considerations will be affected by the changing nature of globalisation of non-financial firms.[77]

Another caveat with regard to a reduction in advanced economy banks' foreign presence concerns the euro area banking market. Banking in the euro area became more fragmented during the 2007–09 financial crisis and the subsequent euro area sovereign debt crisis, and because banking flows before these events were skewed towards interbank activity rather than more stable lending to firms and households.[78] Reduced intra-region banking flows and low retail banking integration within the euro area present policy challenges distinct from international exposures elsewhere – private risk-sharing can help address asymmetric shocks within a monetary union where a single monetary policy is unable to do so.[79] Yet private risk-sharing could still be facilitated by the cross-border equity funding of banks, or the greater use of cross-border funding of non-financial sector investments through capital markets.

Regional expansion by EME banks entails the same broad risk implications as earlier (non-regional) expansion by large advanced economy banks into EMEs, yet there may be important nuances in the nature of risk. For instance, diversification benefits derived for home and host parties may be smaller due to business cycles that are already more synchronised at the regional level.[80] Concentration risk could also develop for smaller host economies since many of the expanding regional banks are from the largest EMEs (and some advanced economy banks have retrenched at the same time).[81] On the other hand, the presence of foreign banks might be more stable if it is grounded in deeper trade and investment links and host economy risks are better understood and managed by regionally focused EME banks.

In addition to the geographical patterns of foreign bank presence, there have also been important changes in the nature of banks' foreign banking business. The post-crisis shift away from cross-border to local intermediation for many banks should enhance the resilience of foreign banking activity, given that local lending and funding proved more stable during the crisis. For example, the local deposit-funded lending of foreign bank subsidiaries in Latin America was relatively steady.[82]

Notwithstanding this trend and the general improvement in advanced economy bank funding structures, the global net US dollar funding needs of foreign banks appear to remain large. Prior to the crisis, some European banks made extensive use of short-term foreign exchange and US dollar money markets to fund longer-term US dollar assets, but found it unexpectedly difficult to roll over their funding when financial sector strains emerged in 2007.[83] The net USD positions of some European banks – for example German and UK banks – have declined over recent years. Yet positions for Japanese banks and, to a much lesser extent, Canadian banks, have

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[77] For a useful discussion of changes in multinational firms, see Baldwin (2016).

[78] ECB (2017b).

[79] Praet (2016) and ECB (2016c).

[80] CGFS (2014a).

[81] In this regard, Ehlers and Wooldridge (2015) find higher concentration in creditor banking systems for borrower countries across many countries in the Asia-Pacific region than before the crisis.

[82] Kamil and Rai (2010); Cull and Martinez Peria (2013).

[83] McGuire and von Peter (2012).

expanded significantly as their foreign banking activity has increased.[84] A possible mitigating factor, based on discussion with banks, is that, unlike prior to the crisis, foreign banks do not appear to be sourcing US dollar funding in FX markets for longer-duration US dollar assets, and thus generating mismatch in the maturity of their obligations. Additional quantitative evidence would be necessary to reach a more definite conclusion.

4.6 Overall assessment

The analysis in this chapter considers the impact of post-crisis changes in the structure and performance of banking for the stability of the sector. The key messages are summarised below.

Resilience and risk-taking. Several indicators and stress test results suggest that banks globally have enhanced their resilience to adverse shocks by significantly building up capital and liquidity buffers. Advanced economy banks appear to have reduced risk through the shift to more stable funding sources and assets that are less complex or typically pose lower risk. Feedback from supervisors indicates that banks' risk management has also considerably improved – for example, bank boards' focus on risk has increased and they are receiving better risk information, while risk functions have become more influential. Even so, supervisors indicated that there remains significant scope for improvement in banks' risk management practices. Moreover, surveillance of future risks to banking stability remains crucial.

Market sentiment and future profitability. While credit spreads for large banks have declined somewhat over recent years, equity market sentiment towards some banks remains soft. Low returns earned by some banks over recent years are expected to persist and investors appear sceptical about the long-term viability of certain business models. Simulations indicate that some banks would continue to earn inadequate returns even under optimistic assumptions, suggesting more extensive cost-cutting and structural adjustment are required, particularly among European banks.

System-wide effects. The impact of structural change for system-level stability is harder to assess than at the bank level because of greater uncertainties surrounding interactions within the system. Nonetheless, with this caveat in mind, a number of changes are consistent with the objectives of public authorities and the reform process. First, foreign banks appear to be more focused in their geographical presence and are conducting more of their intermediation locally. Second, interconnections between banks through lending and derivative exposures have declined. Third, policymakers in some European banking systems with relatively high capacity have made progress in consolidating.

The potential effects of a decline in business model diversity (at a general level) is of interest. The Group did not investigate if banks have been building up common exposures or funding sources in ways that could prove problematic, as such analyses require very granular data. Nonetheless, it is worth noting that the repositioning of many large banks towards commercial banking is, in many respects, an intended effect of the regulatory changes, with the increase in deposit funding a clear example.

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[84]   BIS (2017b) and Borio et al (2017).

5. Implications for the efficiency of the banking sector

This chapter analyses the impact of structural changes in banking on the provision of financial intermediation services at a high level. It first focuses on bank credit and then discusses the provision of capital market related services – namely investment banking and trading.

5.1 Bank credit provision to the real economy

Given the essential role of bank credit for the functioning of the real economy, this section analyses how ongoing structural changes in banks have affected banks' ability to perform their core function in credit intermediation.[85] It first covers general trends in the provision of bank credit. It then discusses the role of supply factors (the tightening or loosening of credit standards) in shaping these trends, and drivers of these changes in the supply of credit.

Developments in overall bank credit since the crisis

In the years leading up to the crisis, bank credit expanded rapidly across a number of advanced economies (see Graph 2). Lending standards deteriorated: some loan structures involved high leverage on the assumption that asset valuations would continue to rise, while a substantial share of lending was directed to borrowers with relatively weak repayment capacity, such as subprime borrowers in the United States or certain property developers in some European countries.

Trends in bank lending have diverged across the globe in the aftermath of the crisis.[86] Bank credit growth to the non-financial private sector suffered only a temporary respite in advanced economies that were not directly affected by the crisis – bank credit was about 20 percentage points of GDP higher in mid-2017 than at the peak of the crisis (Graph 24, top left-hand panel, red line). By contrast, those economies that bore the direct impact of the crisis went through a significant process of deleveraging, as much of the growth in credit-to-GDP in the years ahead of the crisis has been since unwound.

The importance of the crisis and the post-crisis adjustment in bank balance sheets for overall credit (and bank performance) is evident from experiences at the country level (Graph 24, top right-hand panel). Economies that had pronounced pre-crisis credit booms and a large stock of non-performing loans in the wake of the crisis (eg Ireland and Spain) have seen substantial falls in credit, while credit has also contracted in some economies where large banks required substantial balance sheet consolidation and repair (eg the United Kingdom). Data at the bank level show that lending growth has been negative for numerous European banks, including European G-SIBs, in the post-crisis period (Graph 24, bottom left-hand panel).

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[85] This chapter focuses on the quantity of provision of financial intermediation services. Besides quantities, Philippon (2015) also considers the intermediation efficiency of the US banking system and finds that the unit cost of financial intermediation has not fallen significantly between 1886 and 2012. Bazot (2017) analyses the costs of financial intermediation for European countries from 1950 to 2007, and concludes that it has increased since the late 1960s.

[86] Classification of countries into crisis and non-crisis is based on the financial crises database of Laeven and Valencia (2012).

In contrast to advanced economies, bank credit has expanded rapidly in China over the past decade, especially in 2009 as part of the Chinese government's policy response to the crisis (Graph 24, top left-hand panel, purple line). It has also grown at a firm pace across other EMEs (yellow line) throughout most of the post-crisis period, registering a slowdown only recently.

Data on credit gaps – that is, the difference between the credit-to-GDP ratio and its long-term trend – show that most advanced economies currently exhibit negative credit gaps, reflecting deleveraging after the prior build-up in credit

Trends in bank credit   Graph 24

Bank credit-to-GDP[1, 2]
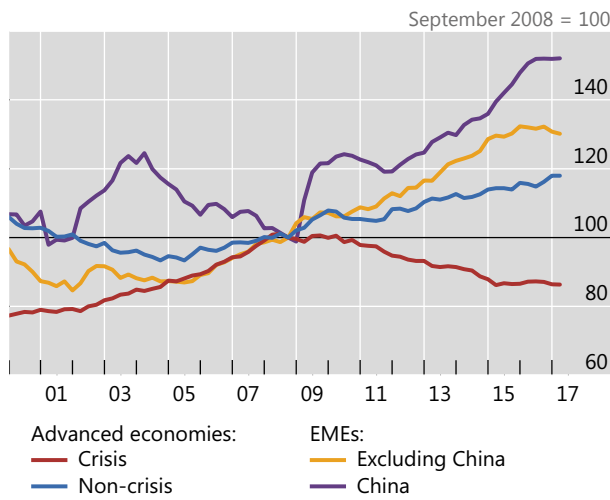
Change in credit-to-GDP and return on equity, in percentage points[1, 3]
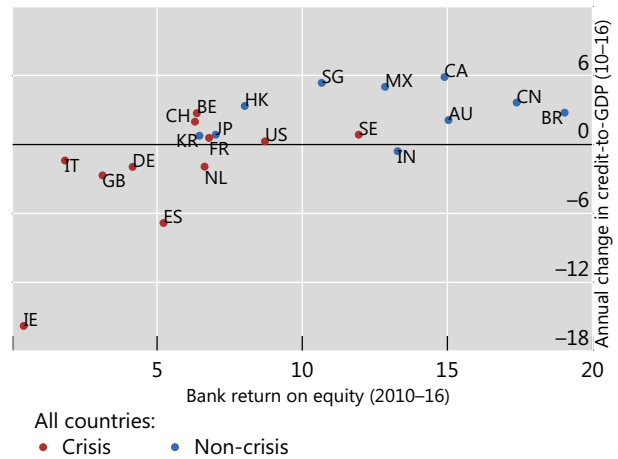
Lending growth by region and G-SIBs[4]
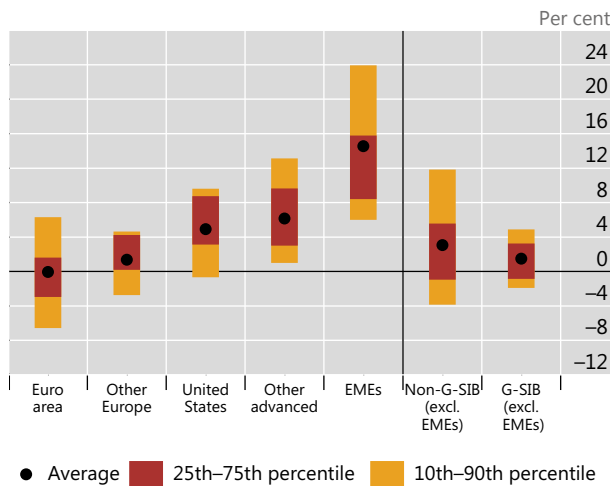
Credit-to-GDP gaps[1, 5]
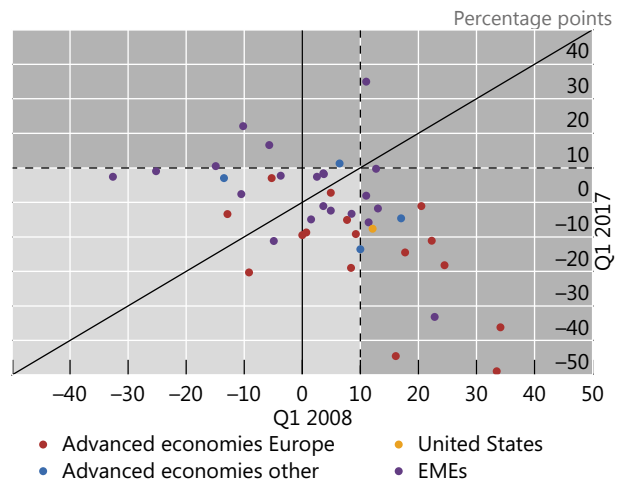
[1] Credit to the private non-financial sector.   [2] Advanced economies are grouped into crisis and non-crisis countries based on the Systemic Banking Crises Database from Laeven and Valencia (2012). Non-crisis countries include Australia, Canada, Finland, Japan, Norway and New Zealand. Crisis countries comprise Austria, Belgium, Germany, Denmark, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States.   [3] Based on the sample of individual advanced economy and EME banks in Annex 2; for country codes, refer to Graph 4; IE = Ireland.   [4] Annual average growth in loans over 2010 to 2016.   [5] Shaded areas indicate the threshold of 10% of GDP for the absolute level of credit gap. For a derivation of critical thresholds for credit-to-GDP and property price gaps, and their measurement, see Drehmann et al (2011).

Sources: SNL; BIS.

(Graph 24, bottom right-hand panel). In contrast, for a number of emerging market economies, credit gaps are 10% or more of GDP, with China at more than 30%, at the upper end of the pre-crisis experience.

Changes in the supply of bank credit since the crisis

A key question in assessing the influence of post-crisis structural changes on bank credit intermediation is their impact on the supply of bank loans. Credit officer surveys provide a means, albeit imperfect, to address the difficult issue of distinguishing between shifts in credit demand and supply.

Surveys suggest that in major advanced economies bank credit markets tightened substantially between 2009 and mid-2011 (Graph 25, left-hand and centre panels). Tighter credit supply was evident even in countries where banks were relatively less affected by the crisis (eg Japan). Bank lending standards eased after mid-2011, with the exception of banks in the euro area where tightening of bank lending continued until 2013–14 reflecting significant pressures to de-risk in the midst of sovereign debt-related stresses.

Bank credit standards[1]

Diffusion index   Graph 25

Non-financial corporations lending in advanced economies[2]

Mortgage lending in advanced economies[3]

EMEs

Lhs (inverted):   Rhs:
— Japan   — United States
— United Kingdom   — Euro area

Lhs (inverted):   Rhs:
— United Kingdom   — United States
                     — Euro area

Inverted scale:
— EMEs (aggregate)
— Africa and Middle East
— Latin America
— Emerging Europe
— Asia
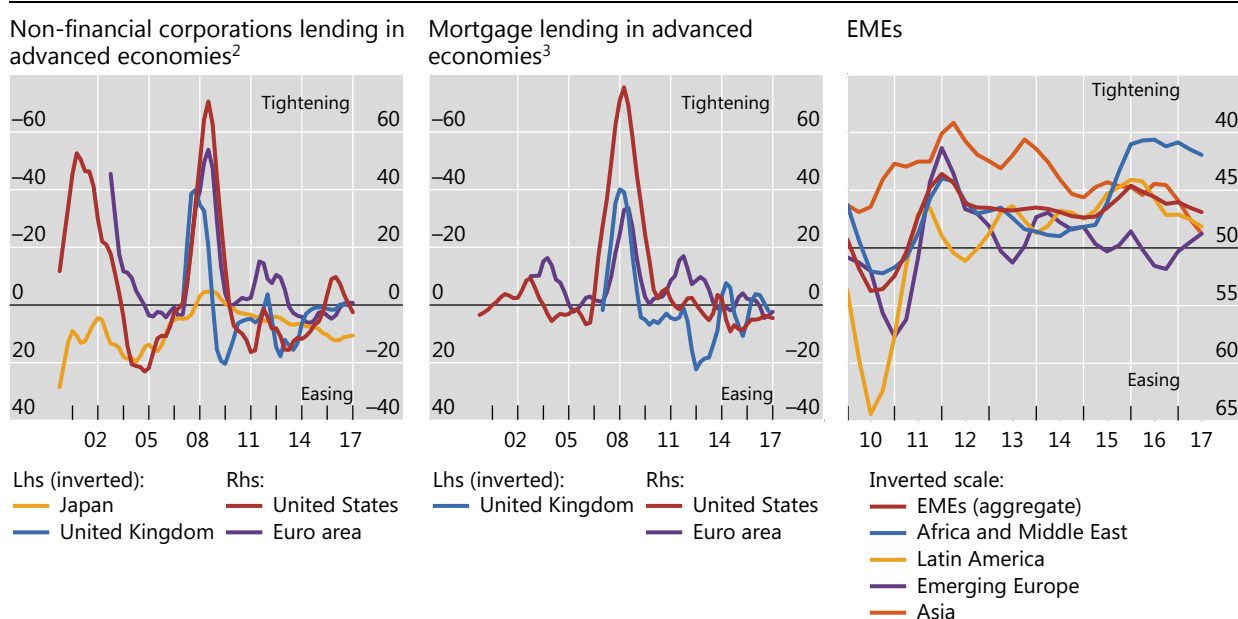
[1] Bank of England Credit Conditions Survey, US Senior Loan Officer Opinion Survey, euro area Bank Lending Survey and Bank of Japan Senior Loan Officer Survey. The data have been smoothed using a weighted linear regression.   [2] The Bank of England survey refers to corporate sector lending. The ECB survey refers to terms and conditions for loans to all firms. The Federal Reserve survey refers to the net balance of respondents which report tightening standards for C&I loans.   [3] The Bank of England survey refers to changes in credit availability of borrowers with a high LTV ratio (more than 75%). The ECB survey refers to terms and conditions for loans to households for house purchases. The Federal Reserve survey refers to the net balance of respondents in the US Senior Loan Officer Opinion Survey reporting tightening standards for residential mortgages.

Sources: Bank of England; Bank of Japan; European Central Bank; Federal Reserve; Institute of International Finance.

According to the credit surveys, credit supply conditions did not evolve symmetrically across firms during the crisis, with credit to large firms more significantly affected than that for SMEs. Nonetheless, tighter credit standards are likely to have had a more substantial impact on SME borrowers than large firms, given

that SMEs have less access to alternative forms of finance. Indeed, there is evidence that, as bank lending fell in the euro area, some large firms were able to increase their bond issuance.[87] More generally, non-financial corporations have sourced a greater share of funding from bond markets across a range of countries since the crisis (see Section 2.2 above).

Credit supply conditions to households also tightened during the crisis, particularly for residential mortgages. In the United States, for example, standards for many types of residential mortgage have since eased gradually, but they have remained tight for non-traditional borrowers and borrowers with poor credit histories.88 Available data on US bank lending by borrower risk segment suggest that there are currently notably lower proportions of high-risk borrowers relative to 2006, reflecting tighter credit standards, but also changes in the credit-eligible population (Graph 26, right-hand panel). Mortgage lending to higher-risk segments – such as loans with high loan-to-value ratios – has been tightened in parts of Europe, such as in the Netherlands and the United Kingdom.

More generally, credit surveys indicate that easier credit standards in the major advanced economies over recent years have been underpinned by improved macro-financial and property market conditions and banks' increasing risk tolerance as well as stronger competition among banks.[89]

Lending growth, NPLs and US household lending   Graph 26

Loan growth and NPL ratios in advanced economies, in per cent
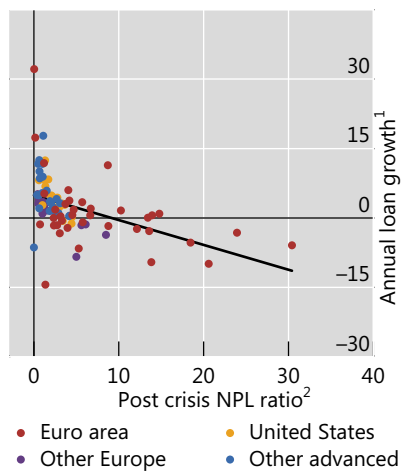
Change in non-performing loans and average equity, in percentage points[3]
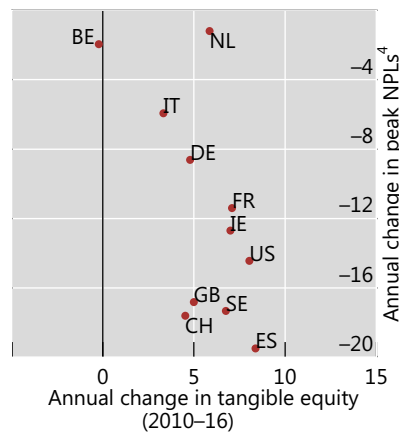
US consumer risk score distribution by loan type and year[5]
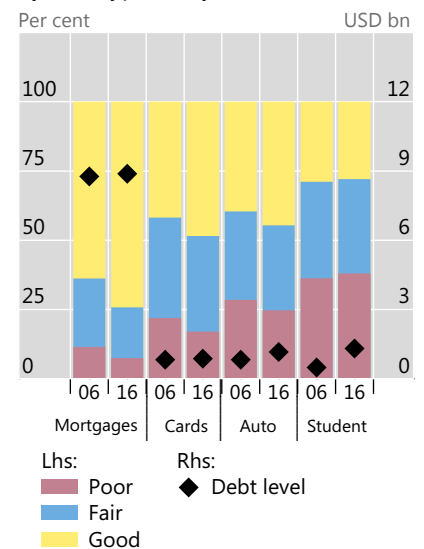
[1] Annual average growth in loans from 2010 to 2016.   [2] Annual average NPL ratio from 2010 to 2016.   [3] Based on the sample of individual advanced economy and EME banks in Annex 2; for country codes, refer to Graph 4; IE = Ireland.   [4] Annualised reduction as a percentage of maximum peak NPL ratio since 2007.   [5] Annual average growth in loans from 2010 to 2016.

Sources: Federal Reserve Bank of New York; Equifax; SNL.

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[87]   Kaya and Wang (2016).

[88]   FSOC (2016).

[89]   Stronger competition among banks and easing lending standards is also identified in Bassett et al (2014), BOJ (2017) and SNB (2016).

EME bank credit standards have tightened over recent years, in association with the maturing of the credit cycle and softer commodity prices (Graph 25, right-hand panel). Lending conditions appear to be uniformly tight for all types of lending in emerging economies, with commercial real estate the most affected loan segment.

As noted in Chapter 3, the supply of international credit has declined significantly since the onset of the crisis as European banks have retrenched and many internationally active advanced economy banks have shifted their international business towards local origination and local funding in local currency. Some areas of cross-border credit provision – such as trade finance – have recovered, as other market participants have stepped in to fill the breach.[90] However, there has been a significant reduction in the number of correspondent banking relationships globally and a decline in the value of transactions in some countries over the post-crisis period.[91] As such, concentration in the supply of these cross-border banking services has increased in some markets. These changes appear to reflect a range of factors including banks' concerns around regulatory compliance of correspondent relationship and inadequate profitability, as well as changes in risk appetite.[92]

The findings of the Central Eastern and South-Eastern Europe Bank Lending Survey of the European Investment Bank provide some further insight into international bank lending. Cross-border credit extended in this region by foreign banks grew strongly prior to the crisis, and some retail lending was denominated in foreign currency. The survey suggests that foreign banks have often applied tighter credit standards than domestic banks in the aftermath of the crisis, consistent with their process of deleveraging and de-risking, and their move to a more self-sustained and domestically funded business model. In addition, banks have generally maintained tighter credit standards on foreign currency-denominated loans, in association with new regulatory requirements.

Drivers of changes in the supply of bank credit

The heterogeneity in credit supply conditions across banks and countries reflects the incidence of different cyclical and structural factors.

Macroeconomic uncertainty can be detrimental to credit growth as banks are less willing to finance projects when their returns are volatile and less predictable. Alessandri and Bottero (2017) find that a rise in aggregate uncertainty reduced Italian banks' loan approval rate, but the negative impact on credit supply is smaller for better capitalised banks with higher liquidity buffers. Similar results are found in the literature for other advanced and emerging market economies.[93]

A large stock of **non-performing loans** may also impede credit supply.[94] Banks exhibiting high NPL ratios in the post-crisis period have tended to reduce their

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[90] CGFS (2014a).

[91] Correspondent banking relationships allow banks to access financial services in different jurisdictions and provide cross-border payment services to their customers (CPMI (2016)).

[92] CPMI (2016), IMF (2017b) and FSB (2017c).

[93] Chi and Li (2017), Bordo et al (2016) and Buch et al (2015).

[94] Bending et al (2014), Cucinelli (2015). However, Accornero et al (2017) argue that the link between NPLs and credit in Italy may be driven by demand-side effects.

lending, particularly in the case of some euro area banks (Graph 26, left-hand panel). Bank-level data indicate that write-offs have mechanically weighed on loan growth, but not to a large extent – on average, net write-offs have reduced average annual loan growth by 50 basis points over 2010–16. The mechanisms by which NPLs negatively impact bank credit supply are likely to be more indirect: NPLs tie up bank capital and distract management from new opportunities, such as by incentivising weakly capitalised banks to postpone the recognition of problem loans through "evergreening". A body of evidence from Japan in the 1990s, as well as from Europe more recently, indicates that evergreening can lead to misallocation and distorted competition in the rest of the economy.[95] Moreover, data show that crisis-hit countries that have more substantially reduced their banking sector NPLs have also rebuilt capital to a greater degree (Graph 26, centre panel).

Banks' **adaptation to global regulatory reforms** also seems to have affected credit supply, although it is not easy to isolate its impact from that of other drivers. First, the impact would depend on the extent that individual regulations were binding constraints for individual banks and banking systems. A number of studies point to a negative impact from tightened capital measures on bank lending, with the impact being larger for banks with lower capital buffers.[96] However, the evidence seems to point only to a temporary decline in supply, as bank loan growth mostly returns to normal after a few years. It also points to a positive long-run relationship between banks' capitalisation and credit.[97] While there is less evidence available for reforms related to banks' liquidity standards (such as LCR and NSFR), it suggests that the introduction of the LCR has had only a limited impact on lending to the non-financial sector, as banks adjusted by reducing interbank lending and increasing HQLA holdings.[98] There is also evidence specifically for the United Kingdom that tighter liquidity regulation had no detrimental effect on lending.[99]

The impact of regulatory reform can also be transmitted across jurisdictions through the operation of foreign banks. The analysis undertaken by the IBRN on the transmission of prudential regulations from home to host countries and vice versa, finds broad evidence that international prudential regulation can spill over to bank lending, but with the extent and direction of spillover varying across instruments and across banks.[100] In addition, there may be a reallocation of international market shares away from less capitalised banks towards better capitalised banks (resulting in host country credit being supplied by more resilient banks). The case of bank lending in Mexico is largely consistent with the evidence on international spillovers (see Box D).

Banks across the globe have increasingly focused on **adopting technological innovations** in recent years, in a desire to cut costs, reduce risk and respond to new

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[95] See Caballero et al (2008) and Peek and Rosengren (2005) for Japan; for Europe, see Albertazzi et al (2010), Schivardi et al (2017) and Storz et al (2017).

[96] See Berrospide and Edge (2010), Bridges et al (2014), Aiyar et al (2014), Uluc and Wieladek (2017) and Fraisse et al (2017).

[97] See Bridges et al (2014) for case of the United Kingdom, and Buch and Prieto (2014) for Germany.

[98] EBA (2013), EBA (2014) and EBA (2015).

[99] Banerjee and Mio (2014).

[100] See Buch and Goldberg (2017).

The implications of regulatory change on bank lending: the case of Mexico

This box provides some evidence of how changes in international regulation, among other factors, may affect the lending behaviour of foreign subsidiaries. The case of Mexico helps to illuminate the effects of the regulations in different jurisdictions for several reasons: first, the relative importance of foreign subsidiaries (more than 70% of total assets of the whole banking system) could make this system more responsive to changes from the policies of parent banks; second, Mexico's definition of capital was broadly similar before and after Basel III; and third, the availability of micro data at the bank-firm level allows the impact to be more effectively tested.

Micro data are used to test whether international regulatory changes have had a different effect on bank lending by subsidiaries of foreign banks as compared with that of domestic banks in Mexico. From a data set that includes all the loans from all banks to non-financial firms, a difference-in-differences regression is run using a panel that includes only a subset of firms that receive credit from both foreign subsidiaries and domestic banks. By controlling for demand and borrower factors, this exercise allows the identification of whether international regulatory changes have had a significant effect on lending by subsidiaries. The regulatory changes considered in the analysis were the implementation of Basel 2.5, Basel III and the LCR. Figure 1 shows the evolution of credit to firms in the sample using credit levels normalised to 100 at the date of regulatory implementation. The three charts hint at the change in behaviour 12 months after the regulatory implementation dates for Basel 2.5 and Basel III, while the effect is less clear for the LCR. The estimation results confirm that the implementation of the LCR did not result in significantly different behaviour, but Basel 2.5 and Basel III did have such an effect, as compared with a year before the implementation.

The use of detailed credit-level information allows us to assess whether foreign subsidiaries have behaved differently after regulatory changes. The preliminary results suggest that changes in international regulation affect bank lending policies. In particular, Basel III has had a significantly different effect on banks with Mexican parents versus foreign subsidiaries: post-Basel III, foreign subsidiaries reduced their credit growth rate by more than domestic banks did, although it is important to emphasise that lending by foreign subsidiaries still continued to grow robustly.

Impact of regulatory reforms on credit to Mexican firms[1]

Nominal credit in Mexican pesos; implementation date = 100   Graph D.1
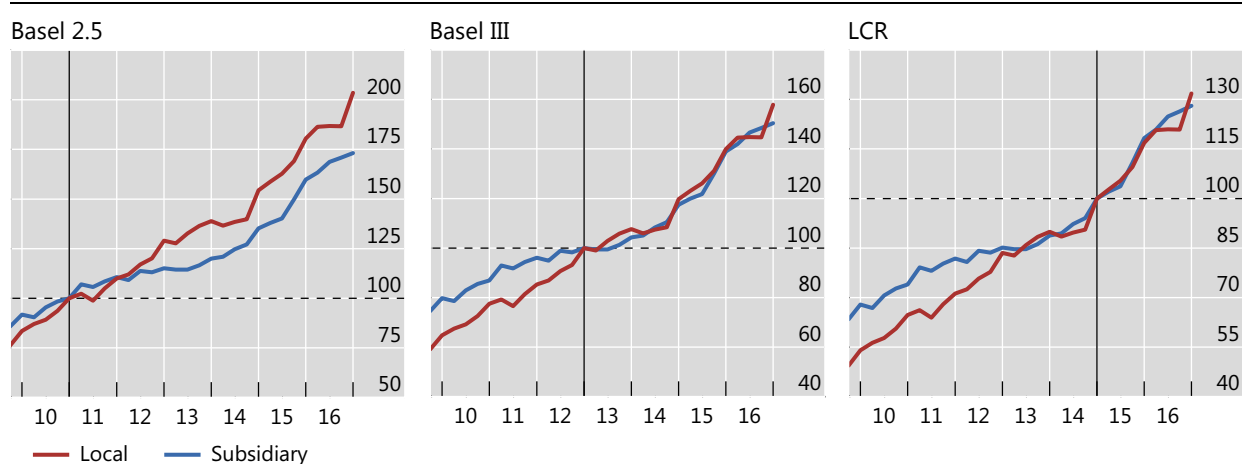
[1] Vertical lines represent implementation dates: Basel 2.5 = January 2011; Basel III = January 2013; LCR = January 2015.

Source: Bank of Mexico; CNBV.

non-bank entrants. This development might be expected to drive changes in bank credit supply of a more structural character, although empirical evidence is limited, possibly because there is no generally accepted metric for measuring technological

innovation. Nevertheless, some studies find a positive relationship between bank credit supply and proxies for technology adoption.[101]

5.2 Banks' role in facilitating capital market activity

This section provides an overview of post-crisis developments in banks' investment banking and trading businesses. There is a particular focus on non-equity trading businesses, which have experienced considerable adjustment as a result of tighter regulation and the unwinding of pre-crisis excesses. The section then discusses the impact of changes in capital market businesses on the market shares by region, as well as the implications for the liquidity of fixed income markets.

Developments in banks' investment banking and trading businesses

Banks' capital markets businesses can be split into two broad categories: investment banking and trading.

Investment banking refers to activities where banks earn fee revenue from raising capital for clients in debt and equity markets, and from advisory services on M&A. This line of business requires little direct capital and tends to generate high, albeit volatile, returns on equity.[102] Investment banking has remained a strategic focus of the large global banks in the post-crisis period and their business units have not changed significantly from pre-crisis years aside from some cost-cutting. Global activity, as measured through deal volumes and fees, has at times approached pre-crisis highs, with volumes in Asia taking on a greater share of the total (Graph 27). Market shares of global revenue have not changed substantially over the post-crisis period, although the top five European banks (all G-SIBs) have ceded some ground to non-US banks over the past couple of years (see Graph 30, right-hand panel).

The second, and larger, area of bank capital market activity and revenue includes various trading businesses, grouped broadly under equity and fixed income, currencies and commodities (FICC). In the boom years prior to the crisis, many banks substantially expanded their trading business, with the largest US and European banks in particular increasing the scope, complexity and geographic reach of their activities, often through the acquisition of independent dealers. Some major US banks also adjusted their strategies and business models towards trading business during the crisis by acquiring failing institutions. Meanwhile, moving in the other direction, some trading firms changed their legal structure to become bank holding companies.

In the wake of the crisis, operating adjustments to banks' trading businesses have been extensive and more pronounced than for investment banking and other bank business lines as flat revenues, rapidly evolving technology and tighter regulation have pressured banks' trading units. Banks have also been reversing excesses built up in the pre-crisis boom, when trading assets and risk were increasingly warehoused on bank balance sheets to facilitate market-making or securitisation, or to support proprietary trading.

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[101] Beck et al (2016) proxy technology adoption using OECD innovation survey data on banks' R&D expenditure, while Koetter and Noth (2013) use banks' IT expenditure.

[102] Based on public disclosures from banks, and RoE of publicly traded standalone non-bank investment banks.

Graph 27

Debt underwriting volumes and fees	Equity underwriting volumes and fees	Advisory volumes and fees
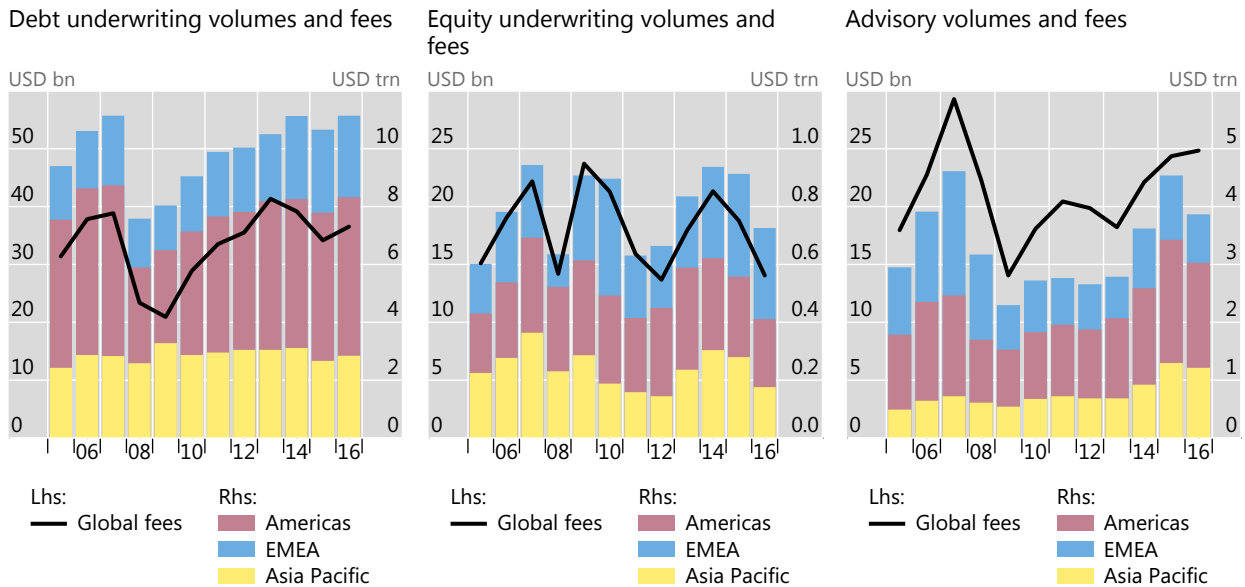
Source: Dealogic.

Equity trading, which includes prime brokerage services to hedge funds, has been a source of strength for banks with strong franchises, as recovering equity prices have buoyed volumes, offset margin pressures and supported revenues. The crisis did not lead to a significant reassessment of equity trading and related risks or the restructuring of activities. Instead, banks have focused on deepening their use of information technology as part of the longer-run transformation of these activities through "electronification" and algorithmic trading. These changes have perhaps shifted the nature of banks' risks for these activities towards harder-to-measure operational risks.

Banks' FICC trading businesses have suffered a drop in revenues and RoE since the onset of the crisis (Graph 28, left-hand panel). Excesses that arguably inflated FICC business performance prior to the crisis have given way to a challenging post-crisis market and revenue environment. For example, private US mortgage securitisation, trading and related derivatives – key drivers of pre-crisis growth in FICC revenues and product complexity – contracted sharply and left many firms with illiquid, loss-making and complex legacy positions. In addition, some large banks have faced substantial fines associated with poor conduct in their FICC trading units (eg LIBOR and foreign exchange collusion and rigging). Post-crisis reforms – including changing risk weight regimes, leverage ratios, prohibition on proprietary trading (in the United States), derivatives and securitisation reforms, and market shocks in mandated stress tests – have affected nearly every area of FICC. The fallout among trading market participants together with regulatory changes has resulted in broad changes in the FICC business. Leverage has been cut back, while the scale and scope of activities has been reduced, particularly for the top European banks, as illustrated in a decline in trading assets (Graph 29, left-hand panel). Banks have also lowered risk in their FICC business, with VaR falling by more than trading assets, to levels below those seen pre-crisis (Graph 29, centre panel).

Largest 10 banks' global trading revenues[1]

In billions of US dollars   Graph 28

Top banks' FICC trading revenues
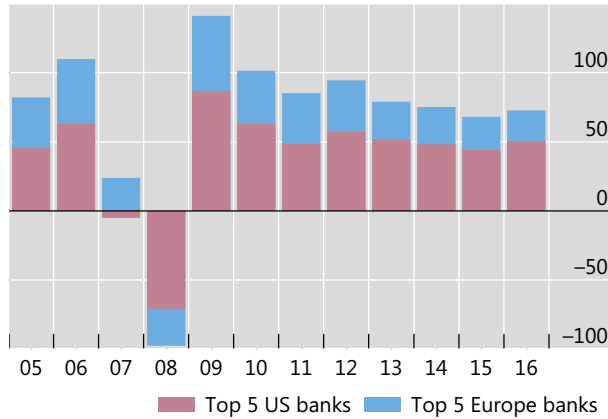
Top banks' equity trading revenues

■ Top 5 US banks ■ Top 5 Europe banks
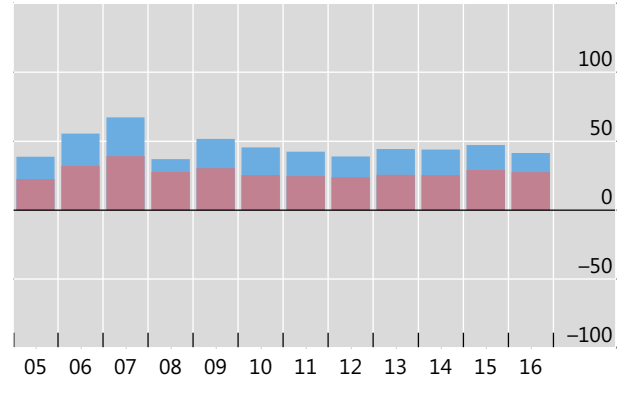
[1] Top 10 banks include: JP Morgan, Citigroup, Bank of America, Goldman Sachs, Morgan Stanley, Deutsche Bank, Credit Suisse, UBS, Barclays, BNP; adjusted for mergers.

Sources: Oppenheimer (2005–09); Bloomberg (2010–16).

Largest 10 banks' trading assets, risk and revenue[1]   Graph 29

Median bank trading assets
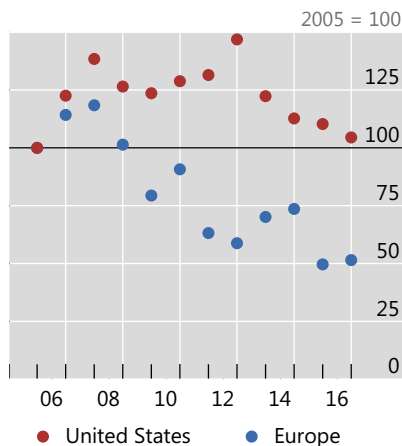
Median bank VaR
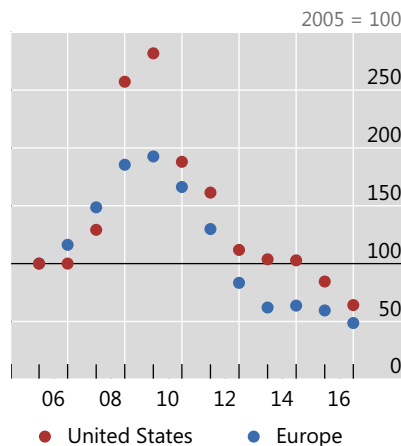
Trading revenue per unit of VaR

● United States ● Europe

● United States ● Europe

■ Average top 5 United States
■ Average top 5 Europe
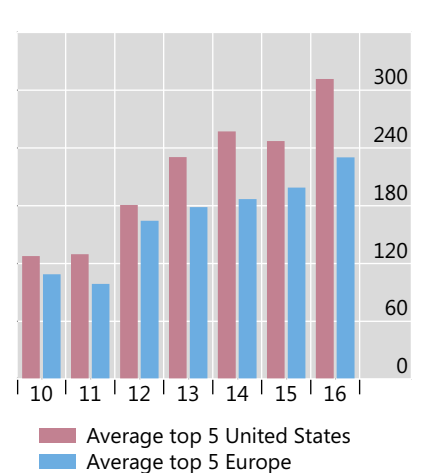
[1] For sample of banks, see Graph 28; not adjusted for mergers.

Source: Companies' annual reports.

Banks have responded by more closely managing balance sheets, collateral, clients and risk taking, including the adoption of quasi-agency trading models where possible, improving revenue relative to trading assets and VaR (Graph 29, right-hand panel).[103] These changes have encompassed the proprietary trading and warehousing of complex derivatives, bonds for market-making, and loans and for securitisation. Derivatives trading has been particularly affected, given the significant increase in the central

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[103] Consistent with this, Iercosan et al (2017) analyse US daily supervisory data and find that, for the average systemically important bank, trading revenue per dollar of VaR committed has trended up over 2011–16.

clearing of OTC derivatives as a result of regulatory reforms, while banks have also reduced their exposures through netting and trade compression techniques.

Implications for capital markets

While some individual banks seem to have cut back their trading risk, the broader question of impact on efficiency (and risk) also requires an examination of the impact of post-crisis changes on the shift of activity to non-banks (including central utilities), the implications for changing concentration of some key trading activities among providers, and the impact on market liquidity.

In trading, the businesses are more heterogeneous, complex, and far more impacted by post-crisis shifts. On the question of trading and market liquidity, the January 2016 CGFS report on *Fixed income market liquidity* highlighted reduced market-making capacity at dealers in the midst of an expanding bond market, supportive monetary policy and rapid technological adoption.[104] The report findings, which focus on sovereign bond trading, indicate a "bifurcation" of liquidity – with liquidity deteriorating most in market segments that were historically less deep to begin with, such as credit trading, and market adjustments more through trade size than the cost of trading. The report and market participants also indicate apprehensions around markets having potentially become more "fragile" during times of stress, given reduced dealer intermediation capacity. In the medium term, the report expects measures to bolster market intermediaries' risk-absorption capacity will strengthen systemic stability, including through a more sustainable supply of immediacy services. The ESRB's October 2016 report on *Market liquidity and market-making* painted a similarly mixed picture, with the researchers' concerns focused primarily on the European corporate bond markets.[105] This topic is still an area of active debate among academics, regulators and market participants. Box E provides a discussion of recent research on US fixed income market liquidity. Furthermore, more research is needed on the link between fixed income liquidity and the real economy.

The above-mentioned pressures and strategic pivots have also left an imprint on the competitive landscape in this sector. The retrenchment of European G-SIBs, particularly in FICC, has roughly halved the number of full-service global firms, most of which are now US-based banks (Graph 30, left-hand and centre panels). These US banks have taken an increasing share of US and European activity.[106] A far larger number of more specialised banks and new non-banks are focused on profitable subsets of products, geographies or clients.[107] Within this group, some niche and regionally focused banks have increased market share, particularly in Asia, which has been the main growth region post-crisis. Important non-banks – exchanges, clearing-houses and trading firms – have also emerged, with many focusing on the segments where trading is most standardised and electronic, while also operating with less stringent leverage constraints.

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[104] CGFS (2016).

[105] ESRB (2016).

[106] Market share data for FICC trading should be treated with caution. Such information is less robust and more subject to estimates than data on other capital market business lines for a variety of reasons, including the OTC nature of some markets, revenue generation through earning a bid-ask spread instead of commissions, and the participation of diverse types of listed and private market-making and principal trading firms.

[107] McKinsey & Company (2016).

Market shares in capital markets revenues[1]

In per cent Graph 30

FICC trading	Equity trading	Advisory and underwriting fees

—— Top 5 United States   —— Top 5 Europe   —— Other
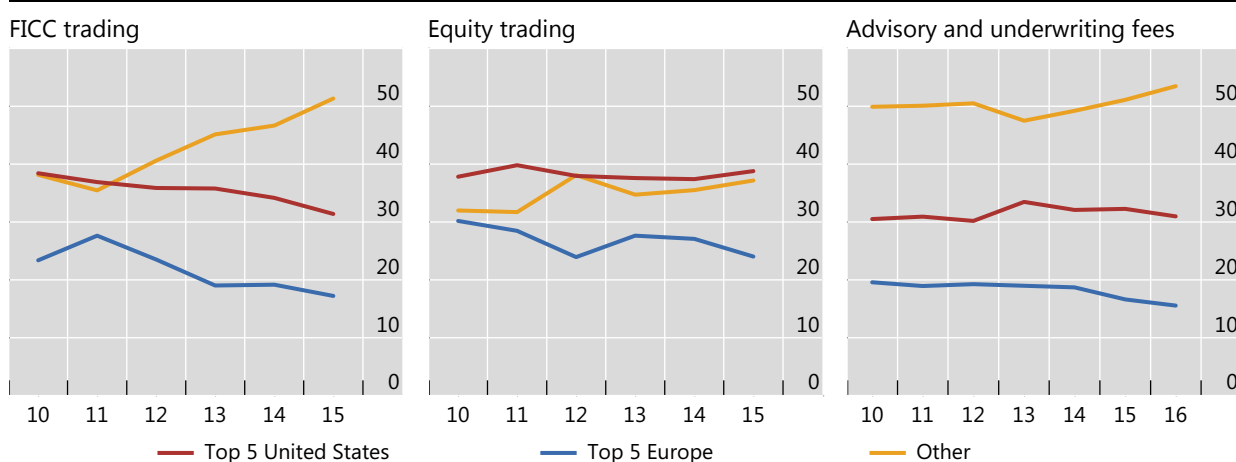
[1] For sample of banks, see Graph 28. Total market size estimates from McKinsey & Company.

Sources: Oppenheimer (2005–09 pro forma for mergers), Bloomberg (2010–16); McKinsey & Company.

The timing and extent of adjustment at banks has been uneven across the industry. UBS was one of the first movers, announcing an exit from some fixed income markets in 2009 and 2012 (see Box B). Other European G-SIBs have since announced cuts to various degrees. As some G-SIBs have exited certain FICC segments and products, revenues have tended to shrink faster than expenses in the short run, resulting in little RoE improvement and prompting heightened market scrutiny of business model sustainability.

Finally, "Brexit" has introduced new operational and market structure uncertainty, given that London has been a global centre for managing and booking capital markets activities. Since the Brexit vote, major trading banks have all announced active contingency plans for shifting some staff and operations from London to new mainland European trading hubs.

5.3 Overall assessment

Trends in bank lending have been uneven across the globe, with large drops in the economies that bore the brunt of the crisis but continuing growth in other jurisdictions. Credit activity at a broad level started to recover in most of the crisis-hit advanced economies after 2015, while in selected countries the adjustment is still ongoing, often reflecting high NPLs. By contrast, advanced economy banking systems that were not so adversely affected by the crisis have continued to show solid loan growth, notwithstanding tighter regulations. Bank lending has also expanded strongly in emerging economies, raising sustainability concerns in some cases.

Across the major advanced economies, credit surveys show that bank credit standards tightened significantly for all types of lending during the financial crisis, and again in the euro area in 2011–13 as concerns about sovereign debt escalated. While credit standards have subsequently eased, there are indications that they remain much tighter for higher-risk households in the United States, loan segments that were at the epicentre of the crisis. In contrast to the situation in advanced economies, credit standards have been tightening in EMEs over recent years, consistent with their differing credit cycles.

US fixed income market liquidity

Market participants' concerns about fixed-income market liquidity in the post-crisis era, and the possible effects of regulatory changes, have spurred significant discussion and analysis. The effects of regulation are difficult to pinpoint, given other factors affecting liquidity in the post-crisis , including voluntary changes in dealer risk-management practices, the growth of electronic trading, the evolving liquidity demands of large asset managers, and changes in the economic environment. Moreover, assessing the status of market liquidity can be difficult due to market fragmentation and data limitations, with limited pre-trade transparency in the corporate market and limited data on dealer-to-customer transactions in the Treasury market.

Adrian, Fleming, Shachar and Vogt (2017) assess liquidity in the US Treasury and corporate bond markets, finding no strong evidence of a widespread deterioration in market liquidity in the years after the crisis. As of mid-2016, average bid-ask spreads for benchmark notes in the inter-dealer Treasury market were narrow and stable, and Treasury market depth and price impact, although suggesting reduced liquidity, were within historical variation and far from crisis levels. For corporate bonds, average bid-ask spreads and price impact declined after the crisis, albeit to levels higher than those before the crisis for institutional trades (ie trades of $100,000 and above). Moreover, corporate bond trading volume and issuance were at record highs.

Consistent with these findings, Mizrach (2015) analyses TRACE corporate bond transactions data from 2003 to 2015, and concludes that "most measures suggest a healthy market" with rising transaction volumes, narrowing bid-ask spreads, and falling price impact of trades. Similarly, looking at price impact, round-trip costs and other measures, Trebbi and Xiao (2015) report "a lack of any form of systematic evidence of deterioration in liquidity levels or breaks in liquidity risk for corporate bonds". Bessembinder et al (2016) further find lower transaction costs during the 2012–14 Dodd-Frank phase-in period than in the 2003–07 pre-crisis period. Anderson and Stulz (2017) also report lower average transaction costs and price impact post-crisis versus pre-crisis for all corporate bond transactions, albeit somewhat worse liquidity for large (over $100,000) trades.

In contrast to these studies on broad liquidity trends, a number of studies document worsening liquidity along some dimension when conditioning on stress events or on the nature of institutions providing liquidity. Bao et al (2016) find that price impact increased among recently downgraded corporate bonds when comparing the pre- and post-Volcker rule periods. Anderson and Stulz (2017) find that liquidity has declined after the crisis during episodes of extreme VIX increases, but do not find evidence that liquidity has worsened for bond-specific (idiosyncratic) stress events, such as extreme bond yield increases and downgrades from investment grade to high-yield. Adrian, Fleming, Shachar and Vogt (2017) consider three case studies in which the resilience of market liquidity was challenged after the crisis – the 2013 "taper tantrum", the October 2014 "flash rally" in the Treasury market, and the liquidation of Third Avenue's high-yield bond fund in December 2015. In all three instances, the degree of deterioration in market liquidity was within historical norms, suggesting that liquidity remained resilient even during stress events. Focusing on a different type of stress event, Dick Nielsen and Rossi (2017) use bond index exclusions as a natural experiment during which index-tracking investors demand immediacy from dealers and find that the price of immediacy significantly increased post-crisis.

Dealer-centric liquidity provision is also explored in a few other recent papers. Choi and Huh (2017) show that dealers act as agents rather than as principals for a higher fraction of trades in the July 2012–June 2015 period as compared with the January 2006–June 2007 period, and that transaction costs have increased for trades that cannot be immediately matched. Furthermore, while Bessembinder et al (2016) estimate lower transaction costs after the crisis, they document a structural break that suggests a decline in dealers' capital commitment relative to the pre-crisis period. Adrian, Boyarchenko, and Shachar (2017) find that there is a relationship between financial institutions' balance sheet constraints and bond liquidity in the post-crisis period so that bonds traded by more levered and systemic institutions, and bonds traded by institutions more akin to investment banks, are less liquid, consistent with more stringent leverage regulation and greater regulation of dealer banks reducing institutions' ability to provide liquidity to the market overall.

Changes in credit supply conditions may be driven by various cyclical and structural factors, including macro-financial conditions, bank balance sheet constraints and regulatory changes. The literature indicates that a large stock of NPLs may impede credit supply, while data show that banks exhibiting high NPL ratios in the post-crisis period have tended to reduce their lending. The literature also suggests a negative impact on credit supply from tighter regulatory capital requirements in the short run, but a positive relationship between capitalisation and credit provision in the long run.

Crisis-era trading losses and related bank failures subsequently motivated some of the most pronounced operating model and strategy shifts. Returns on equity and growth in trading of fixed income, currencies and commodities have been subpar, pressuring overall profitability at some G-SIBs. The scale, scope and risk of activities in this business segment have been reduced, particularly for large European banks. This raises questions about the ability and willingness of banks to act as market-makers, and the resultant impact on market liquidity and fragility during times of stress, especially for fixed income market sub-segments that have been historically less liquid. The evidence for this is mixed. Nonetheless, measures to bolster market intermediaries' risk-absorption capacity will strengthen systemic stability, including through a more sustainable supply of immediacy services. Market participants and regulators also remain watchful of the future competitive implications of the ongoing retrenchment of some European G-SIBs from trading.

6. Key messages

1. **Post-crisis a stronger banking sector has resumed the supply of intermediation services to the real economy, albeit with some changes in the balance of activities.**

The crisis revealed substantial weaknesses in the banking system and the prudential framework, which had led to excessive lending and risk-taking unsupported by adequate capital and liquidity buffers. The immediate impact of the crisis was severe for many advanced country banks and economies. Banking sectors have generally recovered and have been adjusting to the post-crisis regulatory and macroeconomic environment. The report derives some observations that emerge from its analysis of the ongoing adjustment.

There is no clear evidence of systematic and long-lasting retrenchment of banks from credit intermediation. The severity of the crisis was not uniform across banks and systems. Weaker banks cut back credit more strongly, and riskier borrowers saw their access to credit more tightly curtailed. In the immediate aftermath of the crisis the response of policymakers and bank managers was also differentiated across systems, with some moving more decisively than others to address the problems revealed. Bank credit has since grown relative to GDP in most jurisdictions, but has not returned to pre-crisis highs in the most affected countries, reflecting necessary deleveraging and the unwinding of pre-crisis excesses. While disentangling demand and supply drivers remains a challenging exercise, the evidence gathered by the Working Group does not point to systematic change in the willingness of banks to lend locally. In line with the objectives of post-crisis reforms, lenders have become more sensitive to risk and more discriminating across borrowers. But healthy banks

have not changed their overall stance, notwithstanding tighter regulations. If anything, the shift towards commercial banking activities suggests that banks are putting more emphasis on lending than trading activities. Still, given the range of changes in the banking sector over the past decade, policymakers should remain attentive to potential unintended "gaps" in credit to the real economy.

Legacy asset quality problems can be an obstacle to credit growth. Excessive pre-crisis credit growth left a legacy of problem assets, especially high levels of NPLs, which continue to distort the allocation of fresh credit in several countries. Banks and banking systems whose problems were addressed sooner have seen faster recovery post-crisis. Authorities are therefore encouraged to take measures to address NPLs expeditiously, including the stock problem. Persistently high NPLs are likely to lead to greater ultimate losses, impede credit growth and distort credit reallocation, potentially incentivising banks to take on more risk.

Some banks have retreated from capital market-related business. Many banks have reduced their exposure to capital markets activity such as trading and market-making. The shift was most clear among European G-SIBs. It is not clear how this will play out in terms of market structure and profitability as the industry remains in transition, while early evidence points to a shift towards new players. The key consideration from a market functioning perspective is the impact of bank retrenchment on liquidity. The liquidity of some market segments shows signs of fragility and a trend towards bifurcation: traditionally liquid segments remain so, while others have become less liquid.[108] That said, causality remains an open question, and it is therefore important to continue to monitor the impact of banks' and market participants' adaptation to changes in liquidity, especially in fixed income markets.

The international banking landscape was among the areas most affected by the crisis. Foreign bank claims registered a strong decline post-crisis and a number of advanced economy banks, especially from Europe, have reduced the number of foreign markets in which they provide services. By contrast, banks from EMEs and countries less affected by the crisis have expanded their foreign activities, in some cases, quite substantially, in a development that changes the composition of global banking assets. While some cross-border banking services have been maintained, as pullback from some banks has been offset by other market participants, correspondent banking relationships have declined in some jurisdictions because of concerns over litigation risk and inadequate profitability.

2. Longer-term profitability challenges require the attention of banks and supervisors, as they may signal overcapacity and risk-taking incentives.

Post-crisis bank profitability has remained subdued. This reflects many factors, including bank-specific drivers (eg business model choices), cyclical macroeconomic drivers (eg low growth and interest rates) and structural drivers that will have a more persistent impact. An example of this latter group includes regulatory reforms that have implied lower leverage and the curbing of certain higher risk activities, and a reduction of implicit subsidies for large or systemically important banks.

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[108] CGFS (2016).

Banks and their shareholders must adapt to a persistent reduction in profitability, as pre-crisis levels of profitability proved unsustainably high. It is difficult to predict future profitability, but the impact of some drivers that led to a decline of RoE is likely to persist. For example, all else constant, lower leverage and reduced risk-taking should reduce return on equity. Sluggish revenues have dampened profits and, combined with low interest rates, may have contributed to the slower progress made by some banks in dealing with legacy problem assets. At the same time, estimates of bank equity investors' return expectations have remained elevated to date. Taking current market expectations as a benchmark, the Group's analysis suggests that, even in the event of an assumed cyclical upturn, numerous banks' RoE will not rise above the cost of equity currently required by their investors.

Banks' adaptation to an environment of softer profitability could entail further cost-cutting (eg more efficient delivery of services), diversification into new revenue sources or, more problematically, the adoption of a riskier business profile. But where weak profitability is a sign of overcapacity, exit from specific markets or services is an integral component of structural adjustment in the sector.

Over time, investors in banks may have to adjust their expectations, taking into account the effect of structural changes that reduce the risk embedded in banks' shares. These changes relate to the greater resilience of individual institutions and of the system as a whole, as well as to institutions' shift towards business models with less volatile earnings.

Supervisory vigilance is required in monitoring the adaptation of banks to lower profitability. While excessive pre-crisis levels of profitability are not the right point of reference, the adaptation process to more moderate levels is not without risks. Pressure on bank management to achieve a higher RoE may incentivise banks to take excessive risks. Alternatively, banks' exit from low-return activities may lead to capacity constraints for certain critical functions in the financial system. Finally, market pressures may arise over time to increase leverage and bank risk-taking, including through opaque channels.

Sufficient levels of capital are needed for banks to deal with unexpected shocks, and low profitability can weaken banks' ability to maintain sufficient buffers. Banks that lack a steady stream of earnings to repair their capital base after an unexpected loss will have to rely on fresh equity issuance. Yet, markets are usually an expensive source of capital for banks, when accessed under duress. Bank stress tests are one way to assess the impact of a prolonged period of low profitability and reduced access to new capital. Authorities should also resist pressure resulting from the weaker performance of banks to roll back recent regulations and to compromise on resilience. These issues will require the continuing vigilance of supervisors and authorities in charge of financial stability.

Authorities can facilitate adjustment of the banking sector. Whereas adjustment must come first and foremost from banks themselves, policymakers should ensure that it proceeds smoothly and does not threaten the stability of the financial system. In doing so, policymakers need to assess both the root causes of individual banks' challenges and the impact of any structural impediments. If overcapacity is a key driver of low profitability, institutional barriers to mergers must be reviewed and exit regimes applied. If the problem lies with legacy assets (such as NPLs), these should be fully addressed, which might entail a dialogue between prudential authorities and other policymakers (eg those in charge of mechanisms dealing with insolvency). More generally, the application of post-crisis recovery and

resolution regimes is necessary for banks that are unable to meet existing and emerging challenges. The post-crisis period of structural change in banking has shown that the timely and credible use of adjustment mechanisms can enhance investor confidence in banking systems.

That said, intertemporal trade-offs do arise. The exit of financial institutions might be politically costly in the short run, but may pay off in the longer term through more stable banking systems, sounder lending and better allocation of resources. The implicit subsidisation of non-viable business models might have lower short-term costs but could lead to resource misallocation. Similarly, any assessment of consolidation trends needs to take into account potential trade-offs between efficiency and stability, as well as examine the nature and impact of barriers to exit for less profitable banks.

3. Consolidation and preservation of gains in bank resilience requires ongoing surveillance, risk management, and a systemic perspective.

The response by banks and supervisors in the aftermath of the crisis was immediate and has brought about changes in the desired direction. However, more needs to be done to ensure that banks and the financial system remain resilient to future risks.

Banks have made progress in dealing with pre-crisis weaknesses. A number of trends observed in the global banking system since the financial crisis are quite generalised and are in line with the direction of change intended by the regulatory reform agenda. Compared with the pre-crisis period, banks are better capitalised and have lower exposure to liquidity and funding risks. They have also reduced activities that contributed to the build-up of vulnerabilities, such as exposure to high-risk assets, and excessive counterparty risk through OTC derivatives and repo transactions, among others. That said, given that markets have not yet evolved through a full financial cycle, bank restructuring efforts remain under way. In addition, as many relevant reforms have not yet been fully implemented, it is too early to assess their full effect.[109]

Supervisors and markets should avoid becoming complacent about progress to date. Despite progress made, risk is not static. The dynamic evolution of the financial system, shifts in the macroeconomic environment and technological change, create new risks to financial stability. Similarly, some trends in banking systems that we have observed since the crisis, such as the decline in wholesale funding, might be affected by unconventional monetary policy and may not persist.

Success in addressing prior problems does not guarantee that banks will be able to respond to future risks. Ongoing surveillance will thus be necessary to assess the process of adaptation and the evolution of risk-taking within the banking system and the financial system more broadly, taking sufficient precautions with regard to "unknown unknowns". This entails consolidating the gains from the implementation of regulatory reform in terms of stronger capital and liquidity buffers. Supervisors should be wary of signs that banks' adaptations appear to be driven by a desire to arbitrage regulation rather than to address fundamental weaknesses.

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[109]   It is important to note that this project has not been aimed at reviewing specific regulations and their effects. The FSB does plan to conduct such a review through its "Proposed Framework for Post-Implementation Evaluation of the Effects of the G20 Financial Regulatory Reforms".

Improved governance and risk management approaches in banks will be key to future bank resilience. Problems of bank governance and risk management contributed to the crisis and have been a key focus of reform. Given that the sources of future vulnerabilities are hard to predict, banks need to have robust frameworks of risk governance and management to identify and understand emerging risks and their potential impacts for the firm. This remains one of the most important factors for bank resilience, particularly given ongoing changes in business lines, market practice, and financial technology that may test banks' governance and risk management.

The Group did not have the resources to assess how post-crisis adjustments in this area affected incentives and bank resilience across jurisdictions. Given the importance of the question, it may be advisable for the international supervisory community to follow up on the earlier report of the Senior Supervisors Group on risk management weaknesses that contributed to the financial crisis. This follow-up work could review the extent of subsequent risk management improvements vis-à-vis supervisory expectations, and investigate particular questions such as how changes in the risk environment and supervisory and regulatory frameworks have affected the nature of and incentives for sound risk management.

The evolving nature of systemic risk requires surveillance, particularly on certain key areas. Structural changes in the financial system, broader macroeconomic trends, and adjustments to new regulations require continuous surveillance of systemic risk, including the impact from shifting of activities to the non-bank sector, and the rise of fintech.

Systemic risk assessment entails monitoring of different areas. The adaptation of large banks' business models, activities and systemic footprint, requires continuous monitoring. Another area relates to tracking interconnectedness within the system. While recent observations suggest a reduction in the interconnections between banks (for instance, through lower interbank exposures and the use of central clearing for many derivatives), this remains a key channel of contagion. Finally, it is critical to track the degree to which banks become exposed to common shocks. Policymakers should be continuously assessing which common adaptations by banks may have negative implications for financial stability. For instance, higher reliance on more stable sources of funding, such as deposits, may be less problematic than the potential for correlated valuation shocks and fire sales from similarities in asset portfolios. The evolution and impact of fintech on bank business models and services will need to remain a key area of attention.

The shifting of some risk out of the banking sector after the crisis highlights the need for continuing central bank investment in systemic risk analysis of the non-bank financial sector. This includes, for example, the monitoring of CCPs' resilience, liquidity risks associated with the growing size of portfolios of asset managers, and the activities of shadow banks in providing intermediation services.

4. **Better use and sharing of data is critical to enhanced surveillance of systemic risk.**

The Working Group sees scope for making better use of existing and (where necessary) new data sets to improve the ability of central banks and supervisors to monitor systemic risk. Some concrete examples of where progress can be made relate to the availability of information in the following areas:

Better use of the information in transaction depositories. Banks in Europe and the United States are required to report to transaction depositories detailed data on all derivatives transactions (EMIR and Dodd-Frank regulations). The analysis of such granular data could prove invaluable for understanding systemic risk, and even for better identification of microprudential risks. For example, whereas authorities have general information relating to overall quantities of certain types of exposure, they have less insight into counterparties, and more specifically, of counterparty concentrations. Major technical and confidentiality obstacles to gaining access to, and managing, large data sets are a serious practical impediment in their use.

There is scope for enhanced international cooperation on data expertise and analysis. There appears to be considerable scope for international cooperation by authorities in sharing data expertise and analysis (duly respecting confidentiality and data security requirements). For instance, international cooperation between authorities might contribute to more detailed information on interconnectedness and common exposures among financial institutions. Several regional and international initiatives that aim at improving the availability of data and ensuring a better use of existing data sets are under way.[110] Closely linking these initiatives to ongoing policy work should improve surveillance of systemic risk.

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[110] These include EMIR derivatives transactions reporting, European Securities Holding Statistics data, the G20 Data Gaps Initiative or the European Reporting Framework (ERF), which aims at integrating banks' reporting systems. Or INEXDA, an international cooperative project exchanging experiences on the statistical handling of granular data, www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Schlaglichter/G20-2016/iag-update-on-the-data-gaps-initiative-and-the-outcome-of-the-workshop-on-data-sharing.pdf?__blob=publicationFile&v=3.

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Annex 1: Country banking data tables

This annex contains a set of tables with time series system-level banking data across CGFS countries. The data cover various aspects of banking:

- banking market asset size, relative to GDP and total financial sector assets

- other banking market capacity indicators, relative to the population

- banking market concentration ratios and shares of foreign banks

- asset and loan composition, as well as non-performing loan ratios

- funding composition

- capitalisation, including risk-weighted capital positions and simple leverage

- consolidated foreign bank claims

- profitability measures and key performance ratios

- profitability components, relative to assets

Data on banking market size, capacity and concentration are on a domestic (or resident) basis (except for China and Korea), and thus include foreign bank subsidiaries and branches in host jurisdictions but exclude the foreign operations of banks in their home jurisdictions. Other banking data (such as capital positions and profitability) are mainly on a consolidated group basis (ie including banks' foreign operations), although there are some exceptions.

Balance sheet positions and other stock data are presented for every second year, starting 2002 and ending 2016. To reduce volatility, profitability (flow data) is instead presented as the average of two years, starting 2002–03 and ending 2015–16.

An accompanying Excel file provides the full time series from 2000 to 2016, as well as data sources and other metadata, where possible.[111]

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[111]   The full dataset in excel is available at https://www.bis.org/publ/cgfs60/cgfs60_datasets.xlsx

Banking system assets: share of GDP[1]

In per cent

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area			285	322	328	324	299	277
Belgium	282	306	343	359	310	280	275	261
France	238	257	326	384	392	402	395	388
Germany	292	294	300	311	324	301	268	250
Italy		157	186	212	205	217	209	200
Luxembourg	2,640	2,488	2,483	2,451	1,914	1,672	1,479	1,409
Netherlands	239	289	300	345	358	386	375	368
Spain	170	189	240	275	284	298	256	220
Other Europe								
Sweden	174	193	226	289	270	282	297	287
Switzerland	192	195	191	193	207	239	250	283
United Kingdom	327	380	451	531	502	466	384	392
United States	74	78	83	94	86	87	92	91
Other advanced								
Australia	127	147	166	216	196	199	229	246
Canada	88	95	98	112	125	134	117	134
Japan	144	139	141	159	169	187	196	204
Emerging markets								
Brazil	60	70	73	67	100	94	90	110
China	177	195	200	195	228	243	261	304
Hong Kong SAR	462	542	552	630	692	729	816	829
India	63	67	73	83	88	89	89	86
Korea	19	18	31	55	32	33	36	39
Mexico	32	31	33	36	37	37	38	42
Singapore		611	581	643	548	541	581	586

[1] Banking system assets are on a domestic or resident basis, except for Korea and China, which are on a consolidated basis.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Banking system assets: share of total assets across CGFS membership[1]

In per cent

	2006	2008	2010	2012	2014	2016
Euro area	41.7	43.5	38.8	35.6	31.2	26.5
Belgium	1.9	1.8	1.4	1.2	1.1	1.0
France	10.1	10.9	9.8	9.4	8.8	7.7
Germany	12.0	11.3	10.4	9.3	8.1	7.0
Italy	4.8	4.9	4.1	3.9	3.5	3.0
Luxembourg	1.4	1.3	1.0	0.8	0.8	0.7
Netherlands	3.1	3.2	2.8	2.7	2.5	2.2
Spain	4.0	4.4	3.8	3.5	2.7	2.2
Other Europe						
Sweden	1.3	1.3	1.3	1.4	1.3	1.2
Switzerland	1.1	1.1	1.2	1.4	1.4	1.5
United Kingdom	16.4	12.4	11.5	10.7	9.3	7.9
United States	14.5	14.1	12.1	12.0	13.6	14.3
Other advanced						
Australia	1.7	1.9	2.5	2.6	2.6	2.5
Canada	1.6	1.6	1.9	2.1	1.7	1.7
Japan	8.0	8.4	9.5	8.3	7.2	8.3
Emerging markets						
Brazil	1.0	1.2	2.1	2.0	1.9	1.7
China	7.2	9.4	13.3	17.9	23.1	27.4
Hong Kong SAR	1.4	1.4	1.5	1.6	2.0	2.2
India	0.8	0.8	1.2	1.2	1.4	1.5
Korea	1.7	1.3	1.4	1.5	1.6	1.6
Mexico	0.4	0.3	0.4	0.4	0.4	0.4
Singapore	1.1	1.2	1.3	1.4	1.5	1.4

[1] Total assets across CGFS membership calculated as the sum of all non-euro area countries and the euro area aggregate; for this reason numbers in this table do not sum up to 100%.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Share of banking system assets in total financial institution assets[1]

In per cent

	2002	2004	2006	2008	2010	2012	2014	2015
Euro area			53	58	54	53	47	45
Belgium	63	60	57	58	51	49	47	46
France	69	69	73	72	70	70	66	65
Germany	66	63	62	60	68	65	61	59
Italy		64	68	69	60	59	57	56
Luxembourg								
Netherlands	35	38	32	33	29	28	26	25
Spain	69	65	66	67	65	66	64	64
Other Europe								
Sweden								
Switzerland	32	31	26	29	29	31	30	32
United Kingdom	58	50	49	36	38	36	34	36
United States	19	19	18	21	19	19	20	20
Other advanced								
Australia	43	44	42	54	53	55	55	55
Canada	24	23	21	25	23	25	20	19
Japan	31	28	30	30	33	32	34	37
Emerging markets								
Brazil	91	88	52	55	55	52	52	53
China			93	90	89	85	77	75
Hong Kong SAR	90	87	82	84	81	80	80	80
India	76	73	68	63	63	64	64	61
Korea	45	46	45	43	40	38	37	36
Mexico	55	49	47	46	43	41	39	40
Singapore		88	84	85	79	73	71	70

[1] As a share of assets of financial corporations, excluding the central bank. Financial assets when available, otherwise total assets.

Sources: FSB, *Global Shadow Banking Monitoring Report 2016*, May 2017; national data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Banking system capacity indicators: bank branches per population[1]

Number, per 100,000 population

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area	56	54	57	58	55	52	48	44
Belgium		46	43	40	36	34	32	29
France	41	42	41	62	59	58	57	
Germany	62	55	49	48	47	45	44	
Italy	53	54	56	58	57	55	51	48
Luxembourg								
Netherlands	27	23	21	21	17	15	11	10
Spain	92	93	97	99	92	81	68	62
Other Europe								
Sweden	22	21	21	21	20	19	18	15
Switzerland	45	43	42	41	40	38	36	33
United Kingdom	23	22	21	20	19	18	17	
United States	23	24	26	27	27	27	26	
Other advanced								
Australia	25	24	25	25	24	24	23	22
Canada			25	25	24	24	24	23
Japan	17	17	16	16	16	16	16	16
Emerging markets								
Brazil	10	9	10	10	9	10	11	11
China								
Hong Kong SAR	21	19	19	20	20	19	19	17
India			8	9	9	10	11	12
Korea	13	13	14	15	15	17	17	16
Mexico	8	7	8	10	10	11	11	10
Singapore		9	9	8	8	8	8	8

[1] For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Banking system capacity indicators: bank employees per population[1]

Number, per 100,000 population

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area	716	686	692	697	661	637	603	575
Belgium	715	666	631	603	555	534	496	
France	648	638	657	693	661	657	634	634
Germany	911	852	827	822	804	807	790	
Italy	597	585	584	576	542	521	493	487
Luxembourg	5,247	4,956	5,277	5,624	5,229	5,056	4,698	4,523
Netherlands	782	724	715	707	651	619	560	505
Spain	569	557	573	586	552	495	438	407
Other Europe								
Sweden	435	405	429	442	433	411	417	399
Switzerland	1,429	1,342	1,388	1,430	1,373	1,308	1,263	1,204
United Kingdom	632	644	632	644	609	567	559	
United States	701	716	740	708	675	672	643	635
Other advanced								
Australia	699	683	720	722	674	627	651	654
Canada			807	836	840	853	856	843
Japan	229	209	202	219	223	219	217	214
Emerging markets								
Brazil				247	250	264	255	242
China		176	208	205	223	248	275	296
Hong Kong SAR								
India			81	82	83	87	93	98
Korea	191	192	191	210	206	220	228	218
Mexico	102	111	124	142	144	180	188	188
Singapore	779	828	990	1,096	1,166	1,165	1,234	1,232

[1] For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Number of banks[1]

Annex Table 1.6

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area			5,590	6,097	5,714	5,395	4,828	4,385
Belgium		104	105	107	107	104	103	90
France	921	820	763	658	638	611	563	529
Germany	2,593	2,400	2,301	2,169	2,093	2,053	1,990	1,888
Italy	814	778	793	799	760	706	664	604
Luxembourg	177	162	156	152	147	141	144	141
Netherlands	113	113	106	100	87	80	56	47
Spain	274	266	271	280	274	249	219	206
Other Europe								
Sweden	214	211	205	180	172	168	163	158
Switzerland	356	338	331	327	320	297	275	261
United Kingdom					333	335	345	366
United States	9,354	8,976	8,680	8,305	7,658	7,083	6,509	5,913
Other advanced								
Australia	50	50	53	55	54	66	70	82
Canada	67	67	70	74	76	75	79	83
Japan	416	407	396	387	379	377	373	370
Emerging markets								
Brazil	147	139	133	136	137	138	136	134
China		88,150	19,797	5,634	3,769	3,747	4,089	4,398
Hong Kong SAR	224	208	202	200	193	200	203	195
India	97	90	85	79	82	85	90	93
Korea	20	19	18	18	18	18	18	17
Mexico	30	28	31	43	41	43	45	47
Singapore	120	115	108	113	120	123	124	124

[1] For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Banking system capacity indicators: banks per population[1]

Number, per 100,000 population

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area			1.78	1.90	1.74	1.63	1.44	1.29
Belgium		1.00	1.00	1.00	0.98	0.93	0.91	0.79
France	1.50	1.32	1.21	1.03	0.99	0.94	0.85	0.79
Germany	3.14	2.91	2.79	2.64	2.56	2.55	2.46	
Italy	1.43	1.35	1.37	1.36	1.28	1.19	1.09	1.00
Luxembourg	39.86	35.61	33.26	31.42	29.28	26.86	26.20	24.47
Netherlands	0.70	0.69	0.65	0.61	0.52	0.48	0.33	0.28
Spain	0.66	0.61	0.61	0.61	0.59	0.53	0.47	0.44
Other Europe								
Sweden	2.39	2.34	2.25	1.94	1.83	1.76	1.67	1.58
Switzerland	4.87	4.56	4.41	4.25	4.07	3.69	3.34	3.10
United Kingdom					0.53	0.53	0.53	0.56
United States	3.25	3.07	2.91	2.73	2.48	2.26	2.04	1.83
Other advanced								
Australia	0.26	0.25	0.26	0.26	0.24	0.29	0.30	0.34
Canada	0.27	0.26	0.27	0.27	0.27	0.26	0.27	0.28
Japan	0.33	0.32	0.31	0.30	0.30	0.30	0.29	0.29
Emerging markets								
Brazil	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07
China		6.78	1.51	0.42	0.28	0.28	0.30	0.32
Hong Kong SAR	3.33	3.06	2.93	2.87	2.74	2.79	2.80	2.64
India	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Korea	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03
Mexico	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04
Singapore	2.87	2.76	2.45	2.34	2.36	2.32	2.27	2.21

[1] For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Banking system concentration: share of system assets of three largest banks[1]

In per cent

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area								
Belgium	68	70	69	67	60	49	46	47
France				54	58	58	58	56
Germany	18	21	21	20	33	31	31	28
Italy	22	19	19	29	35	35	33	34
Luxembourg		20	20	19	22	23	23	19
Netherlands	71	71	71	72	69	73	76	75
Spain	44	42	40	42	44	46	47	50
Other Europe								
Sweden	64	62	61	61	60	58	58	56
Switzerland	45	48	47	45	43	39	37	40
United Kingdom	28	32	34	33	42	41	37	33
United States	21	25	30	32	33	33	33	32
Other advanced								
Australia	56	53	49	57	60	61	60	60
Canada	57	52	53	52	52	54	56	54
Japan	28	28	34	36	35	36	44	43
Emerging markets								
Brazil	43	45	43	51	54	53	56	57
China								
Hong Kong SAR								
India	34	32	31	29	27	26	26	27
Korea	41	41	39	41	41	40	39	39
Mexico	57	56	61	56	56	52	52	51
Singapore		30	28	28	30	30	33	33

[1] For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Banking system concentration: share of system assets of five largest banks[1]

In per cent   Annex Table 1.9

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area			43	44	47	47	48	48
Belgium	82	84	84	81	75	66	66	66
France				77	81	81	81	82
Germany	26	29	29	27	40	38	37	35
Italy	31	26	26	31	40	40	41	43
Luxembourg		30	29	27	31	33	32	29
Netherlands	82	84	84	84	82	82	86	89
Spain	53	52	49	51	57	62	63	65
Other Europe								
Sweden	81	79	79	80	78	77	77	76
Switzerland	56	58	57	55	53	49	51	53
United Kingdom	41	47	50	45	53	54	51	48
United States	25	31	35	38	44	45	44	43
Other advanced								
Australia	75	72	69	74	78	80	81	80
Canada	85	83	82	80	81	83	81	81
Japan	43	43	45	46	46	47	51	51
Emerging markets								
Brazil	59	60	60	73	76	77	78	82
China		57	55	51	49	45	41	37
Hong Kong SAR								
India	43	41	40	37	35	35	35	36
Korea	57	56	61	60	61	60	59	62
Mexico	72	74	80	78	74	70	73	70
Singapore		42	39	39	41	41	43	42

[1] For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank asset structure: loans as a share of assets[1]

In per cent   Annex Table 1.10

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area	59	60	58	56	56	52	53	55
Belgium			62	55	62	62	64	65
France	33	31	29	28	29	29	29	31
Germany	72	71	70	67	66	55	60	62
Italy		73	71	74	76	74	74	76
Luxembourg	19	17	19	22	25	24	25	28
Netherlands	81	79	79	71	69	69	70	73
Spain	69	72	73	70	69	66	65	66
Other Europe			51	42	51	52	53	54
Sweden	75	73	73	69	73	71	71	77
Switzerland			40	38	41	44	49	50
United Kingdom			53	40	51	51	52	52
United States	60	61	61	57	55	53	53	55
Other advanced	59	57	58	57	56	57	57	57
Australia	68	67	65	59	66	67	65	68
Canada	57	55	55	52	55	62	63	63
Japan	59	56	57	58	53	52	51	51
Emerging markets	63	63	59	56	59	61	61	59
Brazil	44	46	47	51	52	55	58	53
China	78	73	62	56	59	62	62	61
Hong Kong SAR	35	30	30	31	34	37	39	39
India	44	45	55	57	57	60	61	62
Korea	67	69	70	69	73	73	75	75
Mexico	42	38	38	43	41	46	48	50
Singapore		86	87	82	82	84	84	65

[1] Weighted averages for groups of countries, based on total assets. Euro area calculated as a weighted average of individual countries shown above. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank asset structure: debt securities as a share of assets[1]

In per cent

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area	22	22	23	22	23	21	23	21
Belgium	27	25	22	22	20	18	20	16
France	28	31	36	33	29	26	30	28
Germany	21	22	23	23	23	18	19	18
Italy		10	9	12	19	27	25	24
Luxembourg	23	23	25	21	23	20	20	18
Netherlands	11	14	14	19	21	18	17	16
Spain	16	16	11	11	13	15	17	15
Other Europe			24	17	20	17	17	17
Sweden	14	17	19	16	16	14	13	11
Switzerland			31	18	23	17	17	14
United Kingdom			22	16	20	18	18	19
United States	24	23	22	22	25	26	25	24
Other advanced	21	24	23	21	27	26	23	20
Australia	10	11	11	14	16	17	18	16
Canada	17	20	22	14	27	21	20	21
Japan	22	27	26	24	31	31	25	20
Emerging markets	20	18	17	16	16	23	25	35
Brazil	30	29	28	22	20	21	20	22
China	15	12	11	12	12	24	27	41
Hong Kong SAR	21	20	21	18	22	22	20	22
India	38	41	32	28	30	29	28	26
Korea	23	22	21	22	19	18	17	17
Mexico	23	32	36	34	31	27	27	23
Singapore		15	15	13	15	13	12	14

[1] Weighted averages for groups of countries, based on total assets. Euro area calculated as a weighted average of individual countries shown above. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank asset structure: liquid assets as a share of assets[1]

In per cent

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area	7	7	7	7	8	10	11	12
Belgium			12	12	15	15	17	19
France			10	10	10	11	13	13
Germany	6	6	5	4	6	7	8	9
Italy		6	5	5	8	11	13	15
Luxembourg	7	8	7	5	7	7	7	7
Netherlands		7	6	4	6	8	7	11
Spain	13	9	6	7	10	13	15	16
Other Europe			7	8	13	16	15	17
Sweden	3	3	3	2	3	7	7	5
Switzerland								
United Kingdom			8	8	15	18	17	19
United States	6	5	4	8	9	11	15	14
Other advanced	14	16	11	12	17	15	16	18
Australia	3	2	1	2	3	5	7	7
Canada					11	7	6	6
Japan	15	17	13	14	22	22	24	25
Emerging markets	13	14	13	12	18	16	14	15
Brazil	32	33	30	20	25	21	18	19
China								
Hong Kong SAR	6	6	5	7	10	11	9	11
India	33	38	30	30	30	27	26	25
Korea	3	6	7	6	7	6	7	7
Mexico					33	29	28	25
Singapore			6	5	6	9	9	8	10

[1] Liquid assets calculated as cash and balances with central banks plus government securities; weighted averages for groups of countries, based on total assets. Euro area calculated as a weighted average of individual countries shown above. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank lending: share of residential mortgages in total lending[1]

In per cent of total lending

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area	21	23	25	24	20	20	22	22
Belgium					25	29	32	35
France	33	38	42	42	44	46	47	47
Germany					8	8	9	9
Italy	9	11	12	10	14	14	14	15
Luxembourg	6	8	7	8	10	12	14	13
Netherlands	26	25	25	24	23	23	24	24
Spain	23	25	27	26	27	28	32	31
Other Europe	47	48	47	43	46	49	52	54
Sweden	32	39	41	41	45	45	46	48
Switzerland	56	61	63	62	63	63	63	64
United Kingdom	47	47	45	40	41	45	50	51
United States	33	33	33	29	29	28	26	26
Other advanced	24	29	30	28	32	35	34	33
Australia	55	59	57	55	62	63	63	63
Canada	33	37	34	30	32	39	37	35
Japan	19	22	22	22	24	23	22	22
Emerging markets	29	13	11	15	17	19	22	24
Brazil				5	9	12	16	19
China			10	17	18	22	25	26
Hong Kong SAR	35	32	28	24	24	23	20	21
India			12	11	9	9	9	10
Korea					23	24	24	26
Mexico	13	12	17	16	17	16	17	16
Singapore		6	6	6	8	9	9	12

[1] Weighted averages for groups of countries, based on total lending. Euro area calculated as a weighted average of individual countries shown above. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Bank lending: share of business lending in total lending[1]

In per cent of total lending

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area	25	24	25	27	28	27	28	27
Belgium							32	33
France	38	35	34	35	32	32	33	34
Germany	16	15	14	15	15	16	16	17
Italy	37	37	36	35	35	34	32	31
Luxembourg	46	39	40	45	40	38	41	47
Netherlands	19	17	18	21	26	26	33	28
Spain	36	37	39	42	43	38	38	36
Other Europe	25	22	23	22	22	22	22	21
Sweden	46	42	40	43	38	38	36	34
Switzerland	31	29	26	26	26	26	25	25
United Kingdom	20	18	21	18	18	18	17	17
United States	36	34	37	40	35	36	37	38
Other advanced	54	48	45	45	42	38	36	38
Australia	29	28	30	31	27	28	28	28
Canada	29	23	24	29	22	20	21	24
Japan	60	57	55	53	52	50	47	47
Emerging markets	40	26	69	58	57	57	57	58
Brazil	63	57	54	52	48	46	43	40
China			96	72	68	66	65	63
Hong Kong SAR	50	52	55	57	61	62	63	60
India	9	8	7	8	10	10	12	13
Korea				69	66	65	65	62
Mexico	33	36	38	46	46	44	43	46
Singapore		11	12	17	18	21	24	32

[1] Weighted averages for groups of countries, based on total lending. Euro area calculated as a weighted average of individual countries shown above. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank lending: share of other lending in total lending[1]

In per cent of total lending

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area	46	45	42	42	53	53	51	51
Belgium							36	32
France	29	27	24	23	24	23	20	19
Germany					77	76	75	75
Italy	54	52	52	55	51	52	53	54
Luxembourg	49	54	53	47	50	50	46	40
Netherlands	56	58	57	55	51	51	44	48
Spain	41	38	34	32	30	34	30	34
Other Europe	29	30	30	35	32	29	26	25
Sweden	22	20	19	16	17	17	18	18
Switzerland	12	10	11	13	12	11	11	10
United Kingdom	33	35	34	42	40	37	33	32
United States	31	34	30	31	36	36	37	36
Other advanced	23	23	25	27	26	27	30	29
Australia	16	13	13	14	11	9	9	9
Canada	38	41	42	41	46	41	42	41
Japan	21	21	23	25	24	27	31	31
Emerging markets	26	63	67	29	26	23	21	18
Brazil				43	44	42	41	41
China				11	14	12	11	11
Hong Kong SAR	15	17	17	19	15	15	17	19
India			81	81	81	81	79	77
Korea					11	12	12	13
Mexico	55	53	45	37	37	39	40	39
Singapore		83	82	78	74	69	67	56

[1] Weighted averages for groups of countries, based on total lending. Euro area calculated as a weighted average of individual countries shown above. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank asset performance: non-performing loan ratio[1]

In per cent of total loans

Annex Table 1.16

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area			3.0	3.3	4.4	5.4	5.8	5.0
Belgium			1.3	1.7	2.8	3.7	4.2	3.4
France	5.0	4.2	3.0	2.8	3.6	3.6	3.6	3.5
Germany					3.1	2.8	2.3	1.7
Italy			5.8	6.2	9.9	13.5	17.7	17.3
Luxembourg								
Netherlands				1.5	2.6	3.0	2.9	2.5
Spain[2]	0.9	0.7	0.6	3.3	5.8	10.6	12.6	9.2
Other Europe			0.9	1.8	3.8	3.4	1.7	1.1
Sweden							0.5	0.4
Switzerland			0.5	0.8	0.5	0.4	0.4	0.5
United Kingdom			1.1	2.2	4.8	4.3	2.4	1.5
United States	1.4	0.8	0.8	3.0	4.9	3.6	2.0	1.4
Other advanced	6.1	3.1	1.9	2.0	2.1	1.8	1.2	1.1
Australia	1.1	0.6	0.6	1.6	2.1	1.6	1.0	0.9
Canada	1.5	0.7	0.4	0.7	1.1	0.6	0.5	0.6
Japan	7.4	4.0	2.5	2.4	2.4	2.3	1.6	1.3
Emerging markets	16.0	8.3	4.4	2.1	1.5	1.3	1.5	2.1
Brazil	4.3	3.1	3.2	2.7	3.3	3.4	2.7	3.7
China	23.8	13.2	7.1	2.4	1.1	1.0	1.3	1.7
Hong Kong SAR	4.5	2.1	1.0	1.2	0.8	0.6	0.5	0.9
India	11.0	7.4	3.5	2.4	2.5	2.9	4.1	7.8
Korea	2.3	1.9	0.8	1.2	1.9	1.3	1.6	1.4
Mexico	4.6	2.5	2.0	3.2	2.3	2.5	3.1	2.1
Singapore		1.7	0.8	1.0	1.0	0.8	0.8	1.5

These data can be subject to significant measurement differences across countries.

[1] Weighted averages for groups of countries, based on total loans. Euro area calculated as a weighted average of individual countries shown above. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.   [2] The NPL ratio for Spain is calculated on a domestic basis; calculation on consolidated basis results in considerably lower figures.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank funding structure: share of deposits in total funding[1]

In per cent of total funding

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area	33	34	35	37	40	40	43	46
Belgium			48	57	62	66	69	67
France	40	37	33	31	34	37	38	41
Germany	13	14	13	12	15	16	17	17
Italy	52	50	49	48	53	49	53	59
Luxembourg[2]				70	65	68	70	72
Netherlands		33	39	40	36	36	42	42
Spain	65	61	55	57	61	62	65	67
Other Europe			46	47	50	54	59	60
Sweden	31	28	28	26	27	30	30	32
Switzerland			46	54	55	61	64	66
United Kingdom			48	48	52	56	62	63
United States	65	65	65	65	70	74	75	76
Other advanced	67	67	65	67	67	64	63	65
Australia	48	44	41	43	49	55	59	60
Canada	54	56	54	58	59	54	53	55
Japan	71	72	73	74	75	71	69	70
Emerging markets	79	75	76	76	80	80	80	63
Brazil	59	62	65	64	62	59	59	58
China	96	96	92	89	91	91	90	
Hong Kong SAR	56	54	58	56	56	56	55	57
India	89	91	91	91	93	91	91	93
Korea	66	65	61	59	64	67	65	66
Mexico	45	48	44	43	46	47	49	52
Singapore		35	41	41	43	45	45	46

[1] Excludes deposits with banks. Total funding is measured as a sum of deposit funding, other borrowings and equity. Weighted averages for groups of countries, based on total funding. Euro area calculated as a weighted average of individual countries shown above. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.   [2] For Luxembourg, interbank borrowing is excluded from the total funding measure.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank funding structure: share of other borrowing in total funding[1]

In per cent of total funding

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area	59	57	56	53	50	48	45	42
Belgium			48	39	32	26	23	24
France	48	51	56	56	53	51	52	47
Germany	81	81	81	81	78	76	73	73
Italy	39	41	42	42	36	40	34	27
Luxembourg[2]				20	23	20	17	17
Netherlands		49	43	43	45	43	38	39
Spain	29	33	39	37	32	31	28	24
Other Europe			49	48	43	39	34	32
Sweden	67	70	71	72	71	68	68	66
Switzerland			49	41	38	32	29	26
United Kingdom			46	47	41	37	29	28
United States	25	25	24	26	19	15	14	13
Other advanced	29	28	30	29	27	30	31	29
Australia	44	49	53	51	43	37	35	34
Canada	41	38	41	36	35	40	41	39
Japan	26	23	21	22	20	23	25	25
Emerging markets	16	21	18	17	13	11	11	31
Brazil	26	21	19	21	22	27	29	29
China	0	2	2	4	2	1	1	
Hong Kong SAR	40	42	39	41	40	40	41	38
India	11	7	8	7	6	8	8	7
Korea	29	29	32	35	28	24	26	25
Mexico	47	44	46	47	42	42	38	37
Singapore		61	56	55	52	51	51	49

[1] All borrowings excluding deposits with non-banks. Total funding is measured as a sum of deposit funding, other borrowings and equity. Weighted averages for groups of countries, based on total funding. Euro area calculated as a weighted average of individual countries shown above. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx. [2] For Luxembourg, interbank borrowing is excluded from other borrowing and the total funding measure.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank capital positions: Common Equity Tier 1 capital ratio[1]

In per cent of risk-weighted assets

	2013	2014	2015	2016
Euro area		12.7	13.5	13.9
Belgium	15.3	14.7	15.4	15.7
France	13.2	11.7	12.5	13.1
Germany		14.9	15.3	15.7
Italy		12.0	12.3	11.5
Luxembourg		18.4	19.9	24.0
Netherlands		14.4	14.6	15.7
Spain		11.8	12.7	12.8
Other Europe	12.3	13.7	14.7	15.3
Sweden	15.6	17.4	18.9	20.6
Switzerland	17.5	17.4	17.3	16.6
United Kingdom	10.0	11.4	12.6	13.4
United States	11.6	12.5	12.2	12.5
Other advanced	10.4	10.6	11.2	11.4
Australia	8.6	9.0	10.1	9.8
Canada	9.3	9.8	10.0	11.1
Japan	11.4	11.7	12.1	12.1
Emerging markets	10.4	11.0	11.0	11.0
Brazil	11.5	12.3	11.8	12.7
China	9.9	10.8	10.9	10.8
Hong Kong SAR	13.2	13.7	14.6	15.4
India		9.9	10.0	10.5
Korea	11.2	10.8	10.8	12.1
Mexico	13.0	13.5	12.9	12.8
Singapore	13.8	13.6	13.7	13.9

These data can be subject to significant measurement differences across countries.

[1] Weighted averages for groups of countries, based on total assets. Euro area is as reported for the entire region. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank capital positions: Tier 1 capital ratio[1]

In per cent of risk-weighted assets

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area				8.8	11.0	12.5	13.3	14.7
Belgium				11.5	15.5	15.9	15.3	16.2
France				11.3	13.7	15.6	13.1	14.5
Germany				9.7	11.9	13.9	15.3	16.3
Italy	8.0	8.6	7.8	7.6	9.3	11.1	12.4	12.0
Luxembourg	14.3	16.5	14.7	14.3	17.6	15.5	18.5	24.1
Netherlands				10.0	12.2	12.7	15.4	17.9
Spain	10.7	10.2	8.7	8.1	9.6	9.8	11.9	12.9
Other Europe					15.1	17.0	14.7	17.2
Sweden	7.1	7.6	7.1	9.9	13.4	15.5	19.5	23.2
Switzerland					15.9	17.7	18.1	18.6
United Kingdom							12.2	15.1
United States	10.4	10.8	10.6	9.8	12.6	13.0	13.0	12.9
Other advanced	6.4	7.5	8.3	8.9	12.2	11.7	12.0	13.0
Australia	7.7	7.6	7.4	8.2	9.7	10.8	10.7	11.6
Canada	9.1	10.4	10.4	10.1	13.0	11.1	11.3	12.7
Japan	5.8	6.9	7.9	8.7	12.8	12.3	12.8	13.6
Emerging markets	8.5	9.0	10.2	10.2	10.7	10.8	11.3	11.6
Brazil	14.0	15.4	14.4	14.3	13.7	11.9	13.0	13.7
China				10.1	10.1	10.6	11.0	11.3
Hong Kong SAR	13.0	13.6	13.0	11.0	12.2	13.3	13.9	16.4
India	4.2	4.1	6.2	6.9	10.1	10.4	10.1	10.8
Korea	6.1	6.8	8.2	8.2	10.0	9.6	11.4	12.6
Mexico	13.5	12.8	15.1	13.3	14.9	13.8	13.9	13.2
Singapore	11.3	11.5	11.2	11.5	15.5	14.9	13.6	14.3

These data can be subject to significant measurement differences across countries.

[1] Weighted averages for groups of countries, based on total assets. Euro area is as reported for the entire region. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank capital positions: total regulatory capital ratio[1]

In per cent of risk-weighted assets

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area				11.5	13.1	14.3	15.6	17.2
Belgium				60.3	80.0	79.4	71.7	18.8
France	11.6	11.5	10.8	10.6	12.5	14.0	15.3	17.4
Germany				13.5	15.2	17.3	17.9	18.8
Italy	10.8	11.4	10.5	10.7	12.4	13.8	14.7	14.2
Luxembourg	17.3	21.0	17.8	17.2	20.3	17.8	19.6	24.8
Netherlands				12.0	14.1	14.5	18.5	22.4
Spain	10.8	11.0	11.1	11.3	11.9	11.4	13.6	14.7
Other Europe					17.4	18.6	17.2	20.0
Sweden	10.4	10.1	10.0	13.4	15.4	16.7	22.5	26.9
Switzerland					18.2	19.6	20.8	20.7
United Kingdom							14.6	18.1
United States	13.0	13.3	13.1	12.5	15.2	15.0	14.5	14.2
Other advanced	10.0	11.5	12.2	11.9	14.4	14.1	13.8	14.3
Australia	9.8	10.5	10.4	11.4	11.6	12.1	12.4	13.8
Canada	13.0	14.4	13.9	12.9	15.6	14.1	13.4	14.9
Japan	9.5	11.0	12.2	11.7	15.0	14.9	14.6	14.2
Emerging markets	12.4	12.8	13.6	12.7	13.3	14.0	13.8	13.7
Brazil	16.6	18.1	17.8	17.7	16.9	16.5	16.7	17.2
China				12.2	12.3	13.6	13.5	13.3
Hong Kong SAR	15.7	15.4	14.9	14.7	15.8	15.7	16.8	19.2
India	6.2	6.5	8.2	9.8	14.5	14.2	13.0	13.3
Korea	11.4	12.2	12.8	11.9	13.1	12.9	14.0	14.9
Mexico	15.4	14.1	16.1	15.3	16.8	16.0	15.8	14.9
Singapore	16.9	16.2	15.4	14.7	18.6	18.1	15.9	16.5

These data can be subject to significant measurement differences across countries.

[1] Weighted averages for groups of countries, based on total assets. Euro area is as reported for the entire region. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank capital positions: average risk weight[1]

Risk-weighted assets as a per cent of total assets

Annex Table 1.22

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area				42	42	38	39	40
Belgium				34	32	34	35	36
France	64	46	36	33	35	30	32	33
Germany				39	37	30	34	34
Italy		62	76	67	66	57	52	51
Luxembourg	25	22	24	24	28	35	32	
Netherlands				36	36	36	30	30
Spain	65	64	64	57	54	44	46	46
Other Europe	51	47	47	36	35	33	34	32
Sweden	54	47	49	35	31	26	21	21
Switzerland					30	30	32	34
United Kingdom	51	47	46	36	39	36	37	33
United States	73	72	74	74	69	67	70	72
Other advanced	56	53	52	45	41	39	39	38
Australia	69	58	57	43	43	41	40	43
Canada	44	40	39	37	34	34	37	34
Japan	57	55	55	48	43	41	39	39
Emerging markets	71	71	75	46	43	43	65	64
Brazil	68	67	71	74	75	85	75	66
China				30	30	31	63	63
Hong Kong SAR								
India	101	101	100	100	69	71	71	74
Korea	69	68	73	75	75	74	66	62
Mexico	43	52	58	70	65	68	67	63
Singapore	63	60	65	63	54	53	55	59

These data can be subject to significant measurement differences across countries.

[1] Weighted averages for groups of countries, based on total assets. Euro area is as reported for the entire region. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank capital positions: simple Tier 1 unweighted capital ratio[1]

Tier 1 regulatory capital as a per cent of assets

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area				3.7	4.7	4.8	5.3	5.8
Belgium				3.9	5.0	5.3	5.4	5.9
France				3.8	4.9	4.6	4.2	4.9
Germany				3.8	4.4	4.2	5.3	5.6
Italy		5.3	5.9	5.1	6.1	6.3	6.5	6.2
Luxembourg	3.6	3.7	3.5	3.4	5.0	5.4	5.9	6.3
Netherlands				3.7	4.5	4.6	4.6	5.3
Spain	7.0	6.5	5.6	4.6	5.2	4.3	5.5	5.9
Other Europe					4.5	4.8	4.7	5.2
Sweden	3.8	3.6	3.5	3.5	4.1	4.0	4.0	4.8
Switzerland			3.3	3.6	4.7	5.3	5.8	6.3
United Kingdom							4.3	4.8
United States	7.6	7.8	7.9	7.2	8.7	8.7	9.1	9.3
Other advanced	3.4	3.8	4.2	3.7	4.7	4.5	4.5	4.8
Australia	5.3	4.4	4.2	3.6	4.2	4.4	4.3	4.9
Canada	4.0	4.2	4.0	3.7	4.4	3.8	4.1	4.3
Japan	3.1	3.6	4.3	3.8	4.9	4.8	4.8	4.9
Emerging markets	5.6	6.0	7.4	4.6	4.8	4.7	7.3	7.4
Brazil	9.6	10.3	10.2	10.6	10.3	10.1	9.8	9.1
China				3.0	3.0	3.3	7.0	7.1
Hong Kong SAR								
India	4.3	4.1	6.2	6.9	6.9	7.3	7.1	8.0
Korea	4.2	4.6	6.0	6.1	7.4	7.1	7.5	7.8
Mexico	5.8	6.6	8.8	9.3	9.6	9.4	9.4	8.4
Singapore	7.1	6.9	7.2	7.3	8.4	7.9	7.5	8.5

These data can be subject to significant measurement differences across countries.

[1] Weighted averages for groups of countries, based on total assets. Euro area is as reported for the entire region. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Banks' foreign claims by home nationality

In billions of US dollars

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area[1]	5,375	8,320	10,805	12,328	10,241	9,236	8,854	8,235
Belgium	548	781	1,111	957	385	261	212	190
France	1,042	1,700	2,619	3,659	3,138	2,663	2,728	2,487
Germany	2,182	3,204	3,542	3,604	2,998	2,683	2,453	2,087
Italy	308	398	422	1,026	897	843	756	701
Luxembourg	30	38	39	154	100	38		
Netherlands	922	1,475	2,085	1,737	1,333	1,245	1,210	1,252
Spain	343	723	988	1,190	1,389	1,503	1,496	1,517
Other Europe	2,811	4,540	6,152	6,312	6,497	6,582	6,201	5,069
Sweden	174	515	597	665	743	915	863	688
Switzerland	1,282	1,909	2,458	2,003	1,750	1,604	1,740	1,399
United Kingdom	1,354	2,115	3,096	3,645	4,004	4,063	3,599	2,982
United States	742	1,013	1,334	1,463	2,868	3,358	3,092	2,990
Other advanced	1,469	2,127	2,826	3,435	4,188	5,089	5,386	6,056
Australia		262	333	415	588	729	757	712
Canada	327	383	628	710	898	1,139	1,227	1,403
Japan	1,142	1,482	1,865	2,310	2,702	3,221	3,402	3,941
Emerging markets	114	158	224	281	402	637	822	860
Brazil	14	26	30	42	81	98	124	125
China								
Hong Kong SAR								
India	21	20	33	41	56	61	68	118
Korea						110	142	171
Mexico		3	5	8	6	5	6	10
Singapore	79	109	156	190	259	363	482	436
Memos:								
All remaining advanced	*555*	*862*	*1,456*	*1,723*	*1,481*	*1,157*	*1,003*	*841*
All remaining EMEs	*92*	*122*	*190*	*203*	*245*	*304*	*399*	*340*
Global[2]	*11,191*	*17,187*	*23,072*	*25,868*	*26,045*	*26,569*	*26,035*	*24,624*

[1] Euro area total includes only countries shown in the table. Data for other euro area reporting countries is included in "All remaining advanced."   [2] Global data includes restricted data, whereas the values reported by countries for other data items are based on only unrestricted data.

Source: BIS consolidated banking statistics on an immediate counterparty basis.

Shares of banks' foreign claims by home nationality

In per cent of global total

Annex Table 1.25

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area[1]	48.0	48.4	46.8	47.7	39.3	34.8	34.0	33.4
Belgium	4.9	4.5	4.8	3.7	1.5	1.0	0.8	0.8
France	9.3	9.9	11.3	14.1	12.0	10.0	10.5	10.1
Germany	19.5	18.6	15.4	13.9	11.5	10.1	9.4	8.5
Italy	2.8	2.3	1.8	4.0	3.4	3.2	2.9	2.8
Luxembourg	0.3	0.2	0.2	0.6	0.4	0.1		
Netherlands	8.2	8.6	9.0	6.7	5.1	4.7	4.6	5.1
Spain	3.1	4.2	4.3	4.6	5.3	5.7	5.7	6.2
Other Europe	25.1	26.4	26.7	24.4	24.9	24.8	23.8	20.6
Sweden	1.6	3.0	2.6	2.6	2.9	3.4	3.3	2.8
Switzerland	11.5	11.1	10.7	7.7	6.7	6.0	6.7	5.7
United Kingdom	12.1	12.3	13.4	14.1	15.4	15.3	13.8	12.1
United States	6.6	5.9	5.8	5.7	11.0	12.6	11.9	12.1
Other advanced	13.1	12.4	12.2	13.3	16.1	19.2	20.7	24.6
Australia		1.5	1.4	1.6	2.3	2.7	2.9	2.9
Canada	2.9	2.2	2.7	2.7	3.4	4.3	4.7	5.7
Japan	10.2	8.6	8.1	8.9	10.4	12.1	13.1	16.0
Emerging markets	1.0	0.9	1.0	1.1	1.5	2.4	3.2	3.5
Brazil	0.1	0.2	0.1	0.2	0.3	0.4	0.5	0.5
China								
Hong Kong SAR								
India	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.5
Korea						0.4	0.5	0.7
Mexico		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Singapore	0.7	0.6	0.7	0.7	1.0	1.4	1.9	1.8
Memos:								
All remaining advanced	*5.0*	*5.0*	*6.3*	*6.7*	*5.7*	*4.4*	*3.9*	*3.4*
All remaining EMEs	*0.8*	*0.7*	*0.8*	*0.8*	*0.9*	*1.1*	*1.5*	*1.4*

[1] Euro area total includes only countries shown in the table. Data for other euro area reporting countries is included in "All remaining advanced."

Source: BIS consolidated banking statistics on an immediate counterparty basis.

Foreign-owned banks' share of domestic banking system[1]

Share of total assets, in per cent   Annex Table 1.26

	2002	2004	2006	2008	2010	2012	2014	2016
Euro area			16.0	17.0	18.2	18.3	17.2	17.1
Belgium	43.1	27.6	28.4	30.1	65.8	64.3	64.8	63.7
France				3.9	3.3	3.3	5.9	5.5
Germany	1.6	1.3	1.7	2.2	2.6	3.9	3.0	4.3
Italy		7.7	17.2	17.9	15.3	14.7	13.8	14.1
Luxembourg		83.1	84.1	86.6	87.7	88.4	87.8	86.4
Netherlands	10.7	12.4	13.4	12.4	14.2	10.4	7.2	6.8
Spain	9.2	10.8	11.7	10.7	9.6	8.9	8.7	6.1
Other Europe								
Sweden	6.0	7.0	9.0	9.0	8.0	8.0	9.0	10.0
Switzerland	5.9	5.4	6.2	7.7	8.5	13.3	10.5	9.4
United Kingdom	47.6	51.1	50.5	52.6	46.2	45.8	48.2	50.4
United States	13.3	12.5	15.1	16.7	16.7	19.8	20.3	18.4
Other advanced								
Australia	17.0	19.7	21.3	20.0	16.0	13.8	13.3	13.5
Canada	7.0	9.0	10.0	11.0	9.0	7.0	7.0	6.0
Japan	5.1	5.4	6.8	4.0	3.2	2.9	4.0	3.8
Emerging markets								
Brazil	27.4	23.4	24.0	24.2	21.2	19.8	20.1	17.3
China		1.6	1.9	2.2	2.0	1.9	1.7	1.4
Hong Kong SAR								
India	7.6	7.1	7.5	8.9	7.6	7.5	7.4	6.9
Korea	7.6	9.1	8.3	8.1	7.3	6.4	5.4	4.6
Mexico	61.2	73.9	79.8	83.2	74.1	70.9	69.6	67.7
Singapore		74.1	74.0	74.1	69.5	68.6	65.4	63.4

[1] For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank profitability: return on equity[1]

Net profit as a per cent of average equity

	2001–02	2003–04	2005–06	2007–08	2009–10	2011–12	2013–14	2015–16
Euro area	6.3	5.1	10.7	3.6	3.6	0.2	3.2	4.4
Belgium	11.8	14.7	20.4	–11.6	4.0	1.9	6.8	9.2
France				5.5	5.9	3.6	4.7	6.3
Germany	3.7	0.1	7.1	0.1	–0.7	2.3	2.4	3.1
Italy	7.8	8.3	10.5	6.7	2.7	–3.3	–3.9	–1.7
Luxembourg				3.2	8.9	9.0	7.8	7.0
Netherlands				–9.0	3.8	5.0	4.4	7.4
Spain	14.2	14.9	16.1	14.7	8.3	–12.4	6.3	5.8
Other Europe			16.3	3.9	5.8	4.2	4.5	3.9
Sweden			19.7	17.1	7.8	12.0	12.5	12.7
Switzerland			17.1	–3.3	7.7	4.7	5.0	4.0
United Kingdom			15.7	4.9	4.8	2.6	2.7	2.2
United States	13.7	14.3	12.5	3.4	2.2	8.2	9.2	9.3
Other advanced	–10.6	4.1	14.4	5.4	8.0	9.5	10.5	9.2
Australia	14.7	15.3	17.2	15.6	11.7	13.8	14.3	12.1
Canada	11.3	16.2	17.6	15.0	12.1	14.9	14.9	13.6
Japan	–15.1	1.0	13.3	0.5	6.2	7.0	8.1	7.3
Emerging markets	8.2	35.4	18.4	18.3	14.7	18.0	16.7	13.9
Brazil	10.3	16.1	22.6	21.9	16.3	14.6	13.1	13.3
China	5.6	58.0	19.5	21.1	16.7	21.5	19.8	16.0
Hong Kong SAR								
India	15.8	20.0	14.9	14.9	13.7	13.5	11.2	6.3
Korea	11.8	9.4	16.5	10.9	6.5	7.3	3.3	1.9
Mexico	7.5	14.5	22.2	16.9	13.1	13.3	14.1	12.6
Singapore	8.1	9.9	11.5	11.1	9.4	11.5	11.2	10.2

[1] Weighted averages for groups of countries, based on average assets. Euro area calculated as a weighted average of individual countries shown above. Weighted averages for groups of countries may not reflect individual country data as shown in the table because of the use of some confidential series. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank profitability: return on assets[1]

Net profit as a per cent of average assets

	2001–02	2003–04	2005–06	2007–08	2009–10	2011–12	2013–14	2015–16
Euro area	0.3	0.2	0.5	0.2	0.2	0.0	0.1	0.2
Belgium	0.4	0.5	0.6	–0.5	0.2	0.1	0.4	0.6
France				0.2	0.3	0.2	0.3	0.4
Germany	0.1	0.0	0.2	0.0	0.0	0.1	0.1	0.1
Italy			0.8	0.5	0.2	–0.4	–0.5	–0.2
Luxembourg	0.4	0.4	0.6	0.2	0.4	0.3	0.5	0.5
Netherlands				–0.3	0.2	0.2	0.2	0.4
Spain	0.8	0.8	1.0	0.9	0.5	–0.7	0.4	0.4
Other Europe			0.8	0.2	0.3	0.2	0.3	0.2
Sweden		0.7	0.8	0.7	0.3	0.5	0.6	0.6
Switzerland			0.8	–0.1	0.4	0.3	0.3	0.3
United Kingdom			0.8	0.3	0.2	0.1	0.2	0.1
United States	1.2	1.4	1.3	0.4	0.2	0.9	1.0	1.0
Other advanced	–0.4	0.3	0.7	0.3	0.4	0.5	0.6	0.6
Australia	1.0	1.0	1.1	0.9	0.7	0.8	0.9	0.8
Canada	0.9	1.2	1.3	1.0	1.0	1.2	1.4	1.6
Japan	–0.6	0.0	0.5	0.0	0.3	0.3	0.3	0.3
Emerging markets	0.5	0.8	1.1	1.2	1.0	1.2	1.2	1.0
Brazil	1.0	1.7	2.4	2.4	1.8	1.6	1.4	1.3
China	0.2	0.6	0.6	1.1	0.9	1.3	1.3	1.0
Hong Kong SAR	1.2	1.3	1.4	1.2	1.0	1.0	1.2	1.2
India	0.8	1.2	1.0	1.1	1.1	1.1	0.9	0.5
Korea	0.6	0.5	1.2	0.8	0.5	0.6	0.3	0.1
Mexico	0.5	1.2	1.9	1.6	1.4	1.4	1.5	1.3
Singapore	0.8	1.0	1.2	1.1	1.0	1.1	1.0	1.0

[1] Weighted averages for groups of countries, based on average assets. Euro area calculated as a weighted average of individual countries shown above. Weighted averages for groups of countries may not reflect individual country data as shown in the table because of the use of some confidential series. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank profitability: return on risk-weighted assets[1]

Net profit as a per cent of average risk-weighted assets

Annex Table 1.29

	2001–02	2003–04	2005–06	2007–08	2009–10	2011–12	2013–14	2015–16
Euro area				0.5	0.4	0.0	0.4	0.7
Belgium				–3.8	0.6	0.3	1.1	1.7
France				0.6	0.8	0.5	0.8	1.1
Germany				–0.7	–0.1	0.3	0.3	0.4
Italy	0.8	1.0	1.2	0.9	0.4	–0.7	–0.9	–0.5
Luxembourg								
Netherlands				–1.0	0.4	0.6	0.6	1.4
Spain	1.2	1.2	1.4	1.4	0.9	–1.6	0.9	0.9
Other Europe			1.6	0.7	0.8	0.7	0.8	0.8
Sweden		1.5	1.6	1.7	1.0	1.9	2.5	3.1
Switzerland					1.8	0.9	1.0	0.8
United Kingdom			1.6	0.5	0.6	0.4	0.4	0.4
United States	1.6	1.9	1.7	0.5	0.4	1.4	1.5	1.4
Other advanced	–0.7	0.4	1.2	0.6	0.9	1.2	1.3	1.2
Australia	1.3	1.6	1.7	1.5	1.5	1.8	1.9	1.7
Canada	1.2	1.8	2.1	1.8	1.9	2.4	2.4	2.2
Japan	–1.1	0.1	0.9	0.0	0.6	0.8	0.9	0.8
Emerging markets	1.3	1.6	2.2	1.8	2.0	2.7	1.7	1.3
Brazil	1.2	2.7	3.6	3.1	2.5	1.9	1.6	1.7
China					2.4	3.4	1.9	1.4
Hong Kong SAR								
India		1.1	1.0	1.0	1.0	1.0	1.0	0.7
Korea	0.9	0.8	1.7	1.1	0.7	0.8	0.4	0.2
Mexico	1.4	2.8	3.6	2.7	2.1	2.1	2.3	2.0
Singapore	1.0	1.1	1.5	1.4	1.3	1.4	1.2	1.2

[1] Weighted averages for groups of countries, based on average assets. Euro area calculated as a weighted average of individual countries shown above. Weighted averages for groups of countries may not reflect individual country data as shown in the table because of the use of some confidential series. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

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Bank profitability: net interest margin[1]

Net interest income as a per cent of average interest-earning assets | Annex Table 1.30

	2001–02	2003–04	2005–06	2007–08	2009–10	2011–12	2013–14	2015–16
Euro area		1.1	1.0	0.9	1.2	1.2	1.2	1.2
Belgium				1.1	1.4	1.5	1.6	1.7
France				0.7	1.3	1.2	1.1	1.1
Germany	1.1	1.1	1.0	0.9	1.1	1.2	1.2	1.3
Italy								
Luxembourg								
Netherlands				0.9	1.1	1.1	1.2	1.3
Spain								
Other Europe			2.5	2.1	2.1	2.0	2.0	2.1
Sweden		1.5	1.3	1.3	1.2	1.2	1.2	1.1
Switzerland								
United Kingdom			2.7	2.2	2.2	2.2	2.1	2.3
United States	3.9	3.7	3.4	3.3	3.6	3.5	3.2	3.1
Other advanced	1.5	1.6	1.4	1.4	1.4	1.4	1.3	1.2
Australia		3.5	2.3	2.1	2.2	2.1	2.1	2.0
Canada								
Japan	1.5	1.4	1.3	1.2	1.3	1.1	1.0	0.9
Emerging markets	5.6	5.1	5.6	5.6	5.1	3.5	3.1	2.7
Brazil	8.6	9.4	10.4	8.7	8.3	7.3	6.1	5.9
China						2.7	2.7	2.4
Hong Kong SAR	2.1	1.8	1.7	1.9	1.4	1.3	1.4	1.3
India	3.6	3.6	3.7	3.3	3.1	3.5	3.3	3.2
Korea	7.4	6.3	6.2	6.8	5.5	5.8	4.3	3.3
Mexico	4.0	4.1	5.2	6.0	5.6	5.7	6.1	5.8
Singapore	3.6	3.1	4.4	4.5	2.9	2.7	2.5	2.6

[1] Weighted averages for groups of countries, based on average assets. Euro area calculated as a weighted average of individual countries shown above. Weighted averages for groups of countries may not reflect individual country data as shown in the table because of the use of some confidential series. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank profitability: cost-to-income ratio[1]

Operating expenses as a per cent of revenue

	2001–02	2003–04	2005–06	2007–08	2009–10	2011–12	2013–14	2015–16
Euro area	76.6	71.0	69.4	76.6	66.4	68.6	68.1	69.3
Belgium				72.9	70.7	68.9	61.0	58.5
France				72.6	65.0	68.0	68.9	68.6
Germany	84.4	78.2	81.2	81.3	78.3	78.5	80.7	82.7
Italy			63.2	67.3	69.4	70.0	64.5	72.4
Luxembourg	39.8	42.1	38.5	39.1	43.6	53.8	48.4	47.8
Netherlands				186.5	66.3	63.2	63.2	57.7
Spain	55.7	52.7	47.4	43.9	44.8	52.3	50.8	54.1
Other Europe			62.0	74.7	63.7	69.1	70.1	73.4
Sweden		57.0	53.6	52.9	53.5	53.0	49.6	46.8
Switzerland			64.0	99.2	70.1	73.8	70.6	74.4
United Kingdom			62.2	68.6	63.0	70.1	73.8	78.0
United States	57.2	57.5	58.0	65.3	60.3	62.3	62.4	59.7
Other advanced	55.5	54.1	54.6	60.2	57.0	55.7	56.3	58.4
Australia	59.9	58.0	53.4	54.9	53.1	49.2	47.6	47.6
Canada	68.1	67.2	65.6	66.4	61.1	59.3	59.0	59.7
Japan	53.8	51.9	52.9	60.3	57.2	56.8	58.8	61.6
Emerging markets	52.3	46.9	48.3	45.7	47.4	39.0	38.2	36.7
Brazil	69.2	63.0	57.0	56.5	52.4	52.0	54.4	52.8
China	52.5	46.3	47.6	42.5	46.3	33.3	32.3	30.9
Hong Kong SAR								
India	53.0	46.7	50.2	49.5	45.4	45.7	47.0	48.3
Korea	40.5	41.3	47.9	44.7	45.4	44.9	53.7	58.3
Mexico	80.1	67.2	57.7	66.6	67.6	69.3	68.4	68.3
Singapore	40.8	40.3	40.3	41.5	39.7	41.3	42.3	44.2

[1] Weighted averages for groups of countries, based on average assets. Euro area calculated as a weighted average of individual countries shown above. Weighted averages for groups of countries may not reflect individual country data as shown in the table because of the use of some confidential series. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Bank profit components: revenue[1]

In per cent of average assets

Annex Table 1.32

	2001–02	2003–04	2005–06	2007–08	2009–10	2011–12	2013–14	2015–16
Euro area	1.8	1.8	1.9	1.8	1.9	1.8	1.9	2.0
Belgium				1.4	1.6	1.4	2.0	2.2
France				1.9	2.2	2.1	2.1	2.1
Germany	1.4	1.5	1.4	1.2	1.4	1.2	1.3	1.4
Italy			2.9	2.4	2.0	2.0	2.1	2.1
Luxembourg	1.2	1.1	1.2	1.3	1.3	1.2	1.5	1.5
Netherlands				0.6	1.7	1.7	1.7	1.8
Spain	4.1	3.6	3.2	3.1	2.9	2.8	3.2	3.1
Other Europe			3.8	2.4	2.6	2.4	2.5	2.4
Sweden		2.2	2.1	1.8	1.7	1.6	1.6	1.6
Switzerland			2.8	1.8	2.4	2.2	2.5	2.5
United Kingdom			4.3	2.7	2.7	2.6	2.6	2.6
United States	5.7	5.6	5.2	4.6	5.0	4.8	4.5	4.4
Other advanced	2.2	2.3	2.4	2.2	2.2	2.1	2.1	2.0
Australia	3.7	4.0	3.8	3.3	3.1	2.7	2.7	2.4
Canada	6.5	5.9	5.4	4.6	4.9	4.8	5.2	5.8
Japan	1.6	1.6	1.6	1.4	1.4	1.3	1.2	1.0
Emerging markets	3.3	3.6	3.8	4.0	3.7	3.8	3.4	3.1
Brazil	9.4	10.4	11.2	9.4	8.9	8.0	7.0	6.8
China	2.2	2.6	2.7	3.4	3.0	3.3	3.1	2.8
Hong Kong SAR	2.8	2.7	2.7	2.8	2.3	2.2	2.3	2.1
India	4.8	5.3	4.8	4.4	4.3	4.3	4.1	4.1
Korea	2.9	3.1	2.8	2.7	2.3	2.5	2.0	1.8
Mexico	4.2	5.1	6.2	5.3	5.1	5.4	5.4	5.2
Singapore	2.7	2.6	2.6	2.6	2.6	2.5	2.3	2.4

[1] Weighted averages for groups of countries, based on average assets. Euro area calculated as a weighted average of individual countries shown above. Weighted averages for groups of countries may not reflect individual country data as shown in the table because of the use of some confidential series. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank profit components: net interest revenue[1]

In per cent of average assets

	2001–02	2003–04	2005–06	2007–08	2009–10	2011–12	2013–14	2015–16
Euro area	1.2	1.2	1.1	1.0	1.2	1.1	1.1	1.2
Belgium				0.9	1.2	1.1	1.4	1.5
France				0.7	1.2	1.1	1.0	1.0
Germany	1.0	1.0	0.9	0.8	1.0	0.9	0.9	1.0
Italy			1.5	1.4	1.1	1.1	1.0	1.0
Luxembourg	0.6	0.6	0.6	0.7	0.7	0.6	0.6	0.6
Netherlands				1.0	1.1	1.1	1.3	1.3
Spain	2.4	2.0	1.6	1.7	1.8	1.7	1.8	1.9
Other Europe			1.5	1.2	1.1	1.1	1.1	1.2
Sweden		1.2	1.1	1.0	1.0	0.9	0.9	0.9
Switzerland			0.6	0.7	0.7	0.7	0.8	0.9
United Kingdom			1.7	1.4	1.2	1.3	1.3	1.3
United States	3.4	3.2	3.0	2.9	3.1	3.0	2.8	2.8
Other advanced	1.6	1.5	1.4	1.4	1.4	1.4	1.4	1.3
Australia	2.1	1.9	1.9	1.7	1.8	1.8	1.8	1.7
Canada	3.2	2.9	2.5	2.4	2.6	2.6	2.8	3.1
Japan	1.3	1.2	1.1	1.1	1.1	1.0	0.9	0.8
Emerging markets	3.3	3.4	3.6	3.8	3.2	3.2	2.8	2.4
Brazil	7.4	8.0	8.8	7.4	6.9	6.3	5.2	5.0
China	2.0	2.3	2.3	2.9	2.4	2.6	2.4	2.2
Hong Kong SAR	1.9	1.7	1.6	1.7	1.2	1.2	1.2	1.1
India	2.9	3.1	3.2	2.9	2.7	3.1	2.9	2.8
Korea	6.0	5.4	5.3	5.7	4.6	4.5	3.7	2.8
Mexico	3.4	3.6	4.6	5.2	4.9	5.0	5.2	5.0
Singapore	3.2	2.6	3.5	3.6	2.3	2.2	2.1	2.2

[1] Weighted averages for groups of countries, based on average assets. Euro area calculated as a weighted average of individual countries shown above. Weighted averages for groups of countries may not reflect individual country data as shown in the table because of the use of some confidential series. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

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Bank profit components: non-interest revenue[1]

In per cent of average assets

	2001–02	2003–04	2005–06	2007–08	2009–10	2011–12	2013–14	2015–16
Euro area	0.6	0.6	0.8	0.7	0.6	0.6	0.7	0.7
Belgium				0.5	0.4	0.4	0.7	0.7
France				0.7	0.7	0.7	0.7	0.7
Germany	0.4	0.4	0.5	0.4	0.4	0.3	0.4	0.4
Italy			1.4	1.0	0.8	0.9	1.1	1.2
Luxembourg	0.6	0.5	0.7	0.6	0.6	0.5	0.9	0.9
Netherlands				–0.4	0.5	0.5	0.4	0.5
Spain	1.7	1.6	1.6	1.5	1.1	1.1	1.4	1.1
Other Europe			2.3	1.2	1.5	1.3	1.3	1.3
Sweden		1.0	1.0	0.8	0.8	0.7	0.7	0.8
Switzerland			2.2	1.1	1.7	1.5	1.6	1.6
United Kingdom			2.5	1.4	1.5	1.3	1.4	1.2
United States	2.4	2.4	2.2	1.7	1.9	1.8	1.7	1.6
Other advanced	0.7	0.8	1.0	0.8	0.7	0.7	0.7	0.7
Australia	1.6	2.1	1.9	1.6	1.3	0.9	0.9	0.8
Canada	3.3	2.9	3.0	2.2	2.3	2.2	2.4	2.6
Japan	0.3	0.4	0.5	0.3	0.3	0.3	0.3	0.3
Emerging markets	1.3	1.3	1.2	1.3	1.1	1.0	0.9	0.9
Brazil	2.0	2.4	2.4	2.0	1.9	1.7	1.8	1.8
China	0.2	0.3	0.3	0.5	0.6	0.7	0.7	0.6
Hong Kong SAR	0.9	1.0	1.1	1.1	1.1	1.0	1.0	0.9
India	1.8	2.2	1.6	1.5	1.6	1.2	1.2	1.3
Korea	3.9	3.0	2.8	3.5	2.6	2.4	1.9	1.2
Mexico	1.6	2.0	2.2	1.9	2.1	1.8	1.9	1.7
Singapore	0.9	1.0	1.1	0.9	1.0	1.0	0.9	0.9

[1] Weighted average for groups of countries, based on average assets. Euro area calculated as a weighted average of individual countries shown above. Weighted averages for groups of countries may not reflect individual country data as shown in the table because of the use of some confidential series. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

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Bank profit components: operating expenses[1]

In per cent of average assets

	2001–02	2003–04	2005–06	2007–08	2009–10	2011–12	2013–14	2015–16
Euro area	1.3	1.2	1.3	1.2	1.2	1.2	1.3	1.3
Belgium				1.0	1.1	1.0	1.2	1.3
France				1.4	1.4	1.4	1.4	1.5
Germany	1.2	1.1	1.1	1.0	1.1	0.9	1.1	1.1
Italy			1.8	1.6	1.4	1.4	1.4	1.5
Luxembourg	0.5	0.5	0.5	0.5	0.6	0.6	0.7	0.7
Netherlands				1.1	1.1	1.0	1.1	1.0
Spain	2.3	1.9	1.5	1.4	1.3	1.5	1.6	1.7
Other Europe			2.4	1.7	1.6	1.6	1.8	1.8
Sweden		1.3	1.1	1.0	0.9	0.8	0.8	0.8
Switzerland			1.7	1.6	1.7	1.6	1.7	1.9
United Kingdom			2.7	1.8	1.7	1.8	1.9	2.0
United States	3.3	3.2	3.0	3.0	3.0	3.0	2.8	2.6
Other advanced	1.3	1.3	1.4	1.3	1.2	1.2	1.2	1.1
Australia	2.2	2.3	2.0	1.8	1.6	1.3	1.3	1.2
Canada	4.4	3.9	3.6	3.0	3.0	2.8	3.1	3.4
Japan	0.9	0.8	0.8	0.9	0.8	0.7	0.7	0.6
Emerging markets	1.8	1.8	1.9	1.9	1.8	1.6	1.4	1.2
Brazil	6.5	6.6	6.4	5.3	4.6	4.2	3.8	3.6
China	1.2	1.2	1.3	1.5	1.4	1.2	1.1	1.0
Hong Kong SAR	1.2	1.1	1.1	1.2	1.2	1.0	1.0	0.9
India	2.5	2.5	2.4	2.2	1.9	2.0	1.9	2.0
Korea	1.2	1.3	1.3	1.2	1.0	1.1	1.1	1.0
Mexico	3.4	3.4	3.6	3.5	3.5	3.7	3.7	3.5
Singapore	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.1

[1] Weighted averages for groups of countries, based on average assets. Euro area calculated as a weighted average of individual countries shown above. Weighted averages for groups of countries may not reflect individual country data as shown in the table because of the use of some confidential series. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank profit components: loan impairment expense[1]

In per cent of average assets

	2001–02	2003–04	2005–06	2007–08	2009–10	2011–12	2013–14	2015–16
Euro area	0.4	0.3	0.3	0.4	0.4	0.5	0.4	0.3
Belgium				0.5	0.4	0.3	0.2	0.2
France				0.2	0.4	0.4	0.2	0.2
Germany	0.4	0.3	0.3	0.4	0.3	0.1	0.1	0.1
Italy			0.2	0.2	0.4	0.5	0.9	0.8
Luxembourg	0.2	0.1	0.0	0.5	0.2	0.1	0.1	0.1
Netherlands				0.4	0.3	0.3	0.3	0.1
Spain	0.6	0.4	0.4	0.6	0.9	1.7	1.0	0.8
Other Europe			0.3	0.4	0.6	0.4	0.3	0.2
Sweden		0.0	0.0	0.1	0.3	0.1	0.1	0.1
Switzerland			0.0	0.1	0.1	0.1	0.3	0.1
United Kingdom			0.4	0.6	0.8	0.5	0.3	0.2
United States	0.6	0.4	0.3	1.1	1.6	0.5	0.2	0.3
Other advanced	0.8	0.5	0.1	0.3	0.3	0.1	0.1	0.1
Australia	0.2	0.2	0.1	0.3	0.4	0.2	0.1	0.1
Canada	0.8	0.3	0.2	0.3	0.6	0.3	0.3	0.4
Japan	0.9	0.5	0.1	0.3	0.1	0.1	0.0	0.0
Emerging markets	0.8	0.8	0.6	0.7	0.6	0.6	0.5	0.5
Brazil	1.8	1.6	2.0	2.1	2.4	2.2	1.9	2.2
China	0.5	0.5	0.4	0.5	0.3	0.3	0.3	0.3
Hong Kong SAR	0.4	0.1	0.0	0.1	0.1	0.0	0.0	0.1
India	2.7	2.4	1.6	0.9	0.9	1.1	1.4	1.5
Korea	1.0	1.2	0.3	0.4	0.7	0.6	0.5	0.5
Mexico	0.8	0.5	0.7	1.8	1.8	1.4	1.7	1.6
Singapore	0.4	0.2	0.1	0.3	0.4	0.2	0.1	0.2

[1] Weighted averages for groups of countries, based on average assets. Euro area calculated as a weighted average of individual countries shown above. Weighted averages for groups of countries may not reflect individual country data as shown in the table because of the use of some confidential series. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs60/cgfs60_metadata.xlsx.

Bank profit components: other expenses[1]

In per cent of average assets

Annex Table 1.37

	2001–02	2003–04	2005–06	2007–08	2009–10	2011–12	2013–14	2015–16
Euro area	–0.2	0.1	–0.1	0.0	0.1	0.2	0.1	0.1
Belgium				0.3	–0.1	0.1	0.2	0.2
France				0.1	0.1	0.2	0.2	0.1
Germany	–0.3	0.0	–0.2	–0.1	0.0	0.0	0.0	0.0
Italy			0.0	0.0	0.0	0.4	0.3	0.0
Luxembourg	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2
Netherlands				–0.5	0.1	0.1	0.2	0.2
Spain	0.4	0.5	0.3	0.2	0.2	0.3	0.2	0.2
Other Europe			0.3	0.1	0.1	0.2	0.2	0.2
Sweden		0.2	0.2	0.1	0.2	0.2	0.2	0.2
Switzerland			0.3	0.2	0.2	0.2	0.1	0.2
United Kingdom			0.4	0.1	0.0	0.1	0.2	0.2
United States	0.6	0.7	0.6	0.2	0.2	0.4	0.5	0.5
Other advanced	0.5	0.3	0.3	0.3	0.2	0.3	0.2	0.2
Australia	0.3	0.5	0.5	0.3	0.3	0.3	0.4	0.4
Canada	0.3	0.5	0.4	0.2	0.3	0.4	0.4	0.4
Japan	0.6	0.2	0.2	0.3	0.2	0.2	0.2	0.1
Emerging markets	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3
Brazil	0.2	0.5	0.5	–0.4	0.0	0.0	–0.1	–0.3
China	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5
Hong Kong SAR								
India	–1.4	–0.8	–0.2	0.2	0.4	0.2	–0.1	0.1
Korea	0.2	0.1	–0.1	0.3	0.1	0.2	0.1	0.0
Mexico	–0.5	–0.1	0.0	–1.7	–1.6	–1.1	–1.5	–1.2
Singapore	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1

[1] Weighted averages for groups of countries, based on average assets. Euro area calculated as a weighted average of individual countries shown above. Weighted averages for groups of countries may not reflect individual country data as shown in the table because of the use of some confidential series. For information on the consolidation basis and coverage of these data, see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Source: National data, for further details see https://www.bis.org/publ/cgfs/cgfs60_metadata.xlsx.

Annex 2: Individual bank data

The individual bank sample used in this report comprises 168 firms (Annex Table 2). The sample includes consolidated institutions with total assets greater than $100 billion as of year-end 2016, as well as select other domestic systemically important banks. Additions or exclusions of institutions from the sample were made in some instances based on member discretion. Some graphs and tables contain only a subset of these banks because of data availability. Geographic determination is based on the ultimate parent's jurisdiction. In a few instances, foreign subsidiaries are included in certain jurisdictions with large foreign banking presence (eg Mexico). G-SIB status is based on the FSB's 2016 designation.[112]

Bank financial report data are sourced from SNL Financial, except for a few funding indicators and the ratios underlying the business model classification and some related graphs, which are sourced from Fitch Connect.

Sample of individual banks

Annex Table 2

Region/Country	#Banks	#G-SIBSs	Region/Country	#Banks	#G-SIBSs
Euro area	42	8	EMEs	65	4
Austria	2	0	Brazil	3	0
Belgium	3	0	China	17	4
Finland	1	0	Chinese Taipei	6	0
France	6	4	Hong Kong SAR	2	0
Germany	13	1	India	5	0
Ireland	2	0	Israel	2	0
Italy	6	1	Malaysia	2	0
Netherlands	3	1	Mexico	7	0
Spain	6	1	Qatar	1	0
Other Europe	18	7	Russia	2	0
Denmark	2	0	Saudi Arabia	1	0
Norway	1	0	South Africa	1	0
Sweden	4	1	South Korea	1	0
Switzerland	5	2	Turkey	2	0
United Kingdom	6	4	United Arab Emirates	2	0
United States	19	8	Venezuela	2	0
Other advanced	24	3			
Australia	4	0			
Canada	7	0			
Japan	13	3			
			Total	168	30

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[112]   See FSB (2016).

Annex 3: Business model classification methodology

The identification and characterisation of the bank business models is based on Roengpitya et al (2017). This Annex provides a short description of the methodology and the way it has been applied to this report.

Roengpitya et al (2017) use a three-stage approach to define distinct business profiles across banks that is primarily data-driven but also incorporates judgment in a systematic way. At the first stage, they select a set of bank balance sheet ratios that hold the promise of differentiating business profiles and they produce a large number of alternative classifications of banks into business models using cluster analysis (the agglomerative Ward algorithm). In the other two stages, they sort through various possible variants and the associated cluster allocations in order to narrow them down using a goodness-of-fit metric and the judgmental criteria of parsimony and clear discrimination. In the third stage, they combine cluster and discriminant analyses with the criterion of stability of the results in order to further narrow down the variants to a classification that includes four business models.

They use eight candidate input variables that are all ratios expressed in terms of balance sheet size. They are evenly split between the asset and the liability sides of the ledger: Loans-to-Assets, Trading Book-to-assets, Trading Assets-to-Total Assets, Interbank Lending-to Assets, Interbank Borrowing-to-assets, Deposits-to-Assets, Wholesale Funding-to-Assets, and the Stable Funding Ratio. Because the banks in our panel are subject to different accounting standards that result in differences in the reporting of derivative positions, these positions are netted out in calculating the measure of total assets. They interpret these input variables as reflecting *strategic managerial choices,* as opposed to other variables from the income statement of banks, which they consider as not chosen by the banks' management but rather as representing *outcomes* of strategic choices, managerial skill and market conditions. The final sorting of banks into business models is based on three of these ratios (total loans, interbank loans and wholesale debt) but the characterisation is based on the scores of banks on all eight ratios (Annex Table 3).

The adaptation of the results of Roengpitya et al (2017) to the data in this report makes use of the discriminant analysis results produced in the third stage of these authors' paper. Discriminant analysis takes a clustering allocation, estimates a mapping from input variables to that allocation, and summarises this mapping in the probability that a particular observation (a bank) belongs to a given cluster. Using the input ratios for the sample of banks in this report and the estimated discriminant function of Roengpitya et al (2017), these banks can then be classified as belonging to one or the other business model. This classification underpins the further analysis on model characteristics and performance.

Descriptive statistics[1]

In per cent

	Retail-funded	Wholesale-funded	Trading	Universal
Gross loans	**67.9**	**73.2**	**17.2**	**48.9**
	[60.5; 75.6]	**[62.8; 83.3]**	**[0.0; 33.0]**	**[38.7; 56.6]**
Trade	18.9	16.1	53.1	33.2
	[10.6; 28.3]	[6.9; 26.2]	[23.1; 91.1]	[17.0; 47.5]
Trading book	3.3	5.3	17.4	9.3
	[0.1; 9.2]	[0.5; 11.3]	[0.7; 38.6]	[0.3; 22.0]
Interbank lending	**5.6**	**6.0**	**25.3**	**13.4**
	[0.9; 11.5]	**[1.2; 10.8]**	**[3.3; 40.2]**	**[4.5; 23.2]**
Interbank borrowing	7.8	10.3	18.9	13.4
	[0.5; 18.7]	[2.4; 20.0]	[0.0; 42.3]	[2.7; 28.0]
Wholesale debt	**10.0**	**36.1**	**21.0**	**14.6**
	[3.4; 18.2]	**[23.4; 51.3]**	**[4.9; 38.8]**	**[2.3; 34.0]**
Stable funding	76.0	68.4	48.0	63.2
	[62.9; 86.4]	[57.2; 81.5]	[15.4; 85.4]	[42.2; 80.5]
Deposits	68.8	41.0	35.3	53.8
	[50.2; 82.8]	[27.0; 56.1]	[0.0; 76.6]	[26.1; 78.2]
No of bank-year pairs	*556*	*344*	*171*	*532*

[1] Average values; 10th and 90th percentiles in brackets. Statistics associated with the input variables for a given trial, in **bold**.

Sources: Roengpitya et al (2017); Bankscope.

Annex 4: Cost of equity estimation methodology[113]

The cost of equity is estimated for 75 globally active banks using the CAPM (Capital Asset Pricing Model).[114] According to the CAPM, excess expected equity return (ie in excess of the risk-free rate) linearly depends on excess expected market return: the steepness of the relationship is captured by CAPM-beta, the systematic (undiversifiable) risk of the equity.[115] Formally:

$$R_{equity} - R_{risk-free} = \beta (R_{market} - R_{risk-free}) \qquad (1.1)$$

This implies that the expected equity return (ie the cost of equity) of a stock can be decomposed into two main components: (1) the risk-free rate, and (2) the equity risk premium, which is further a function of market excess return (market risk premium or price of risk) and the equity beta (quantity of risk, ie the portion of risk in an equity investment that cannot be diversified away by the marginal investor) as shown below:

$$R_{equity} = R_{risk-free} + \beta_{equity} * \underbrace{(R_{market} - R_{risk-free})}_{market\_risk\_premium}, \qquad (1.2)$$

where the beta coefficient measures the systematic co-movements between the bank stock and the stock index.

Specifically, we estimate the cost of equity in two steps. First, cost of equity is estimated for the market as a whole to infer the market risk premium. Our main assumption here is that history is the best, albeit certainly imperfect, guide for the future. Hence, first we calculate the market-level cost of equity for the United States for each year t as the observed geometric average of historical annual returns from 1920 to t-1. We then calculate expected return for other markets (which tend to have shorter time series available than the United States does) with the help of US estimates and differences in country riskiness (following ideas explained, for instance, in Damodoran (2016)). More concretely, we add to the expected US returns the difference between the CDS spread of the country in question and that of the United States to obtain the expected return for the country index.

Second, we calculate institution-level betas for all banks in our sample. The betas are estimated by obtaining the linear correlation coefficient between observed excess (ie over risk-free) bank stock returns and excess market index returns, as indicated by equation 1.1.[116] In our analysis, we use daily return over a year-long (more precisely, 250 trading days) window to obtain daily beta estimates.[117, 118] Using the above methodology we calculate cost of equity for the 2001–early-2017 period. For graphical representation, we group the estimates by major geographic regions.

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[113] This annex was prepared by Bilyana Bogdanova, Ingo Fender and Elöd Takáts (BIS)

[114] The sample of banks comprises the stock exchange-listed banks from Brei and Gambacorta (2014).

[115] For a discussion of the CAPM, see Damodoran (2016).

[116] Banks and markets are matched. For example, US bank returns are measured against the S&P 500.

[117] While our choice of using daily returns over an annual horizon allows for the straightforward computation of daily betas, it could potentially introduce additional noise through the closing bid-ask spread. Hence, to ensure robustness, we also estimate betas using (i) daily returns over a two-year window and (ii) weekly returns over two- and five-year windows.

[118] As a final step, in order to obtain daily expected return estimates, we interpolate the yearly country specific market risk premium estimates across trading days.

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