

INTERACTION, COHERENCE, AND OVERALL CALIBRATION OF POST CRISIS BASEL REFORMS

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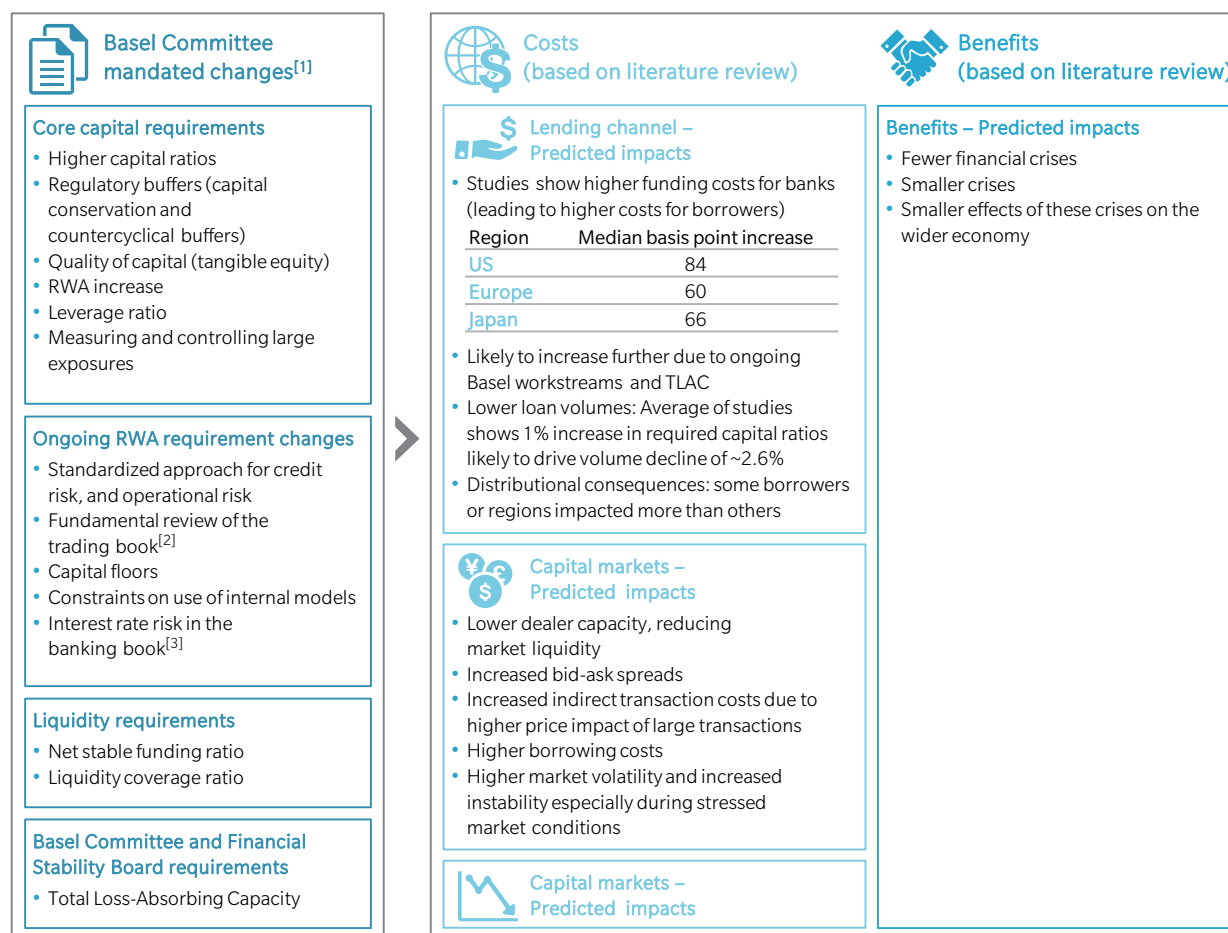
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EXECUTIVE SUMMARY

OVERVIEW

- Since 2009, the Basel Committee on Banking Supervision (“Basel Committee” or “BCBS”) has been leading the global effort to overhaul banking regulation to sharply increase banks’ required capital and liquidity levels. In the wake of the crisis, **most observers agreed that capital and liquidity requirements needed to rise substantially from their pre-crisis levels**, but they also agreed that **there are costs and, in some cases, unintended consequences associated with the Basel reforms**.
- In addition, **the sheer volume of regulatory changes in a relatively short space of time to a complex and varied global financial system necessitates a careful review**. Further, there is less consensus on the need for additional reforms beyond those already completed by the end of 2015. Some observers believe it would be better to wait until these provisions have been fully implemented and their comprehensive impact on the wider economy has been assessed. **There has been no comprehensive quantitative analysis to date of the impact of the full range of the Basel reforms, taken as a package**, making judgments more difficult.
- To its credit, the Basel Committee is actively examining the **“interaction, coherence, and overall calibration”** of the new rules. Our report is intended to examine key issues and assist the Basel Committee, and other policymakers and analysts, in their consideration of how to optimize the global regulations.
- Oliver Wyman undertook this work under a commission from the Global Financial Markets Association, but **the analysis and opinions expressed here are solely those of the authors and do not necessarily reflect the views of Oliver Wyman or the Global Financial Markets Association**.
- This report focuses on the effects of the rules already recommended by the Basel Committee, or which are targeted for completion by the end of 2016, and the Total Loss Absorbing Capacity (TLAC) rules proposed by the Financial Stability Board. We analyze primarily the long-term impacts and not the transition costs of these rules. Nor do we analyze issues of national implementation, except to highlight a few illustrative examples of how they can magnify or complicate the effects of the Basel rules. **Readers should note that national regulations, such as stress tests, add further costs and are, in some cases, more binding than the Basel rules analyzed here.**

FIGURE A: POST CRISIS BASEL REFORMS AND TLAC



[1] Not an exhaustive list

[2] FRTB reforms have been completed

[3] IIRBB reforms have been completed (largely Pillar 2)

“Bank capital is not costless to society. If capital requirements are increased, some of those costs will be passed on to households and businesses in the real economy”

– M. Carney, Governor of the Bank of England,
to Treasury Select Committee, (2016)

- **This report consolidates and interprets the large and growing base of research from official bodies, academics, think tanks, and others, as well as the many comments and analyses provided by participants in the financial sector.** As part of our analysis we reviewed about 100 academic papers, more than 100 letters or studies by the industry, and nearly 200 references and research papers from official sources.
- **Impact on bank lending:** Our analysis of the literature shows the potential for **significant costs for the end users of financial services, primarily households and businesses** that borrow or invest.
- **There is very little empirical research yet available on the actual impact of the Basel reforms, leaving the policy community to rely on best estimates based on quantitative models of what the impact is likely to be.**
 - Bringing together the analyses of likely effects on loan pricing shows median estimates of **potential increases in credit spreads of 60 to 84 basis points**, depending on the region (The range of estimates is wide, however, as will be discussed and illustrated further below).
 - **Loan volumes on bank balance sheets are estimated to decline** as well, with an average decline across the studies of 2.6% for a 1 percentage point increase in required capital ratios.
 - **Higher prices and lower volumes, all else equal, would serve as a drag on the economy**, although it is difficult to measure precise effects and potential offsets, such as from the rise of alternative intermediaries.
 - It is critical to recognize that **the vast majority of studies do not include the additional impacts from the current round of Basel reforms.** These revise the calculations of risk weighted assets (RWA), with expected incremental increases across operational, credit and market risk frameworks. These further changes will increase average bank RWAs, with a lower bound estimate of 10–30% for the proposals as envisioned at the times of the various analyses and significantly higher for some specific financing activities¹. (We refer to this as a lower bound, as many of the studies analyze only a subset of the changes.) More detailed analysis commissioned by the Institute of International Finance and the International Swap Dealers Association, based on a detailed quantitative analysis of bank-level data, has reportedly shown even higher effects than the top of the 10–30% range of increase in average RWA. According to reports², the study shows increases in RWA of roughly 70% on average in certain businesses. This would clearly have substantial implications for banks and their customers. It should be noted that the Governors and Heads of Supervision (GHOS) of the Basel Committee have issued assurances that, upon finalization, the total increase in RWA will not be “significant” in the aggregate for the industry, which suggests they are targeting a lower total effect.

¹ Dawn (2015), Durand (2015), Keenan and Spick (2015), KPMG (2015), Macquarie Equities Research (2016), The Economist (2015), Turner (2012), Graham, Li, and Kruse (2016), IIF (2016), BCBS(2015f), ISDA, GFMA, and IIF (2015), ORX Association (2016), J. P. Morgan Cazenove (2015), Oliver Wyman and Morgan Stanley (2015), The Association of German Public Banks (2016), Risk Control (2016), McKinsey (2015)

² POLITICO Pro Morning Exchange, July 20, 2016

- **Impact on capital markets:** Actions by the Basel Committee will have a substantial impact on the structure of capital markets and on the costs for major participants. There is already evidence of significant changes in market structure, driven both by regulation and by other factors. For example, banks' trading balance sheets have contracted by 25–30% since 2010³. As a result, overall market liquidity could suffer, especially after the full effects of existing regulatory changes, and those still in process, play out in a more normal interest rate environment. The cost of regulation to be absorbed by capital markets is likely to be substantial. For instance, one estimate is that the Leverage Ratio and NSFR requirements will impact bank costs in the 60bps–110bps range in low margin market making activities.⁴
 - Potential effects include **higher direct transaction costs through wider bid-ask spreads, combined with a larger effect from higher indirect costs.** The latter could come from bigger price movements when there is buying or selling pressure from all but the smallest transactions along with the indirect effects of greater overall volatility. Some portions of the markets are already showing such impacts, while others are not (see Section 5).
 - Markets could become less stable and more vulnerable to shocks, which may have adverse systemic repercussions. There is already some evidence of reduced stability (including incidences of extreme movement in prices such as the 2013 “Taper Tantrum” – see Section 5 for more detail), although it is not conclusive. Such instability, combined with higher transaction costs, **could push up liquidity premiums demanded by investors and, again, there is some evidence of this happening already.**
- **Quantifying benefits of the systemic stability resulting from these reforms is challenging.** It requires, for example, an economic analysis of the effects of increases in capital and liquidity at banks on the frequency and severity of financial crises and the attendant implications for the wider economy, based on a sophisticated model of the financial system and its place in the economy as a whole.
- **In view of the difficulties, complexities, and uncertainties of modeling the benefits, we have not conducted an independent analysis of the benefits, or therefore, of the balance of costs and benefits. Our focus in this paper on the potential costs and risks should not be viewed as an overall cost-benefit analysis. Instead, our goal is to highlight areas for the Basel Committee to pay particular attention as they consider the trade-offs.**
- **For the sake of completeness, the body of the report does contain a high-level discussion of analyses of the optimal level of capital done by official bodies and academics, which produce a wide range of estimates.** All of the studies show that significant net benefits are derived from capital levels considerably higher than the pre-crisis required capital ratios. However, a number of the studies suggest that the revised capital requirements could be sub-optimally high, particularly those that include analysis of Total Loss Absorbing Capacity and the ongoing Basel workstreams. Judging whether the rules are mis-calibrated will require policymakers to specify their preferred threshold for the balance between safety and soundness and the effectiveness and pricing of lending and capital markets.
- **Whatever one's view of the balance of the costs and benefits of the aggregate capital and liquidity levels, a review of the specifics of the financial reforms suggests it is likely that some of the costs are unnecessary and result from the problems inherent in such a large and complex regulatory process,** including the potential issues outlined in Table A, the examples for which will be discussed later on.

³ Oliver Wyman and Morgan Stanley (2016)

⁴ AFME (2016)

TABLE A: POTENTIAL ISSUES WITH REGULATORY REQUIREMENTS

POTENTIAL ISSUES	BRIEF DESCRIPTION
Inconsistent sets of rules	- Two or more rules may pull in different directions - Potential to increase the total economic cost without a corresponding benefit in terms of safety and soundness
Mis-calibrated rules	- Many of the rules involve decisions about minimum thresholds or other quantitative criteria - It is possible for the chosen level of reforms to produce too great a cost for the desired benefits - One-size-fits-all definition of thresholds may not allow appropriate consideration of differences in regional financing structures, legal protections and bank balance sheet compositions
Duplication or interaction of coverage	- Rules may be appropriate taken individually, but their interaction results in an undue regulatory burden on certain products or on the system as a whole - These rules drive bank behavior that may create substantial problems for particular activities, services, and products that are important to customers and functioning of the wider market, even if the calibration of overall capital or liquidity levels for the banking system as a whole is broadly appropriate
Unintended consequences	Reforms may create other unintended consequences for the broader economy, such as the potential for homogenization of bank business models, concentration of exposures in parts of the financial sector that are not regulated or regulated only lightly (often referred to as “shadow banks”) or some of the changes in the market structure and the way market participants interact

- Given the potential for such issues, the Basel Committee’s **coherence and calibration exercise should aim at finding the optimal design and calibration of rules, whereby the BCBS stability objectives are met at the least cost to society**, particularly targeting areas of the framework where the same risks are addressed multiple times by different rules.
- The objective of this report is not to make recommendations, but to highlight key issues and to encourage a focus by policymakers on crucial questions such as:
 - Have the reforms, taken as a whole, achieved the proper balance between financial stability and economic costs?
 - Will the price of various products (e.g. loans) be pushed up more than necessary to achieve the desired stability due to the combined impact of regulation (including the leverage ratio, liquidity, credit risk, etc.)? Will the supply of loans decrease to a degree that is detrimental to the growth of the economy?
 - Will the reforms have unintended consequences on market structure and the behavior of market participants as a result of potentially reduced market liquidity, higher costs, increased volatility, and higher contagion risk?
 - Are some customer groups, products, or regions disproportionately impacted by the balance of level of capital vs. risk even if the overall cost-benefit balance is right?
 - Do some of the regulations work at cross purposes, reducing the benefits and raising the costs? Are the right incentives being created?
 - Will the increased cost burden on banks create unintended regulatory arbitrage with an excessive shift of systemic activities into the less-regulated shadow banking sector?
 - Is there an unintended negative impact on global trade and financial flows?

The remainder of this Executive Summary explores the existing literature to examine the areas where potential problems may lie, in order to suggest appropriate areas of focus for the Basel Committee and the Financial Stability Board (“FSB”) in a structured fashion.

BACKGROUND

The global financial crisis and ensuing Great Recession emphasized the importance of the financial system and the need to ensure its stability and effective operations. In response, members of the G20 agreed on principle to enhance the resilience and strength of the financial system.⁵ Leaders of the G20 nations deputized the FSB and the Basel Committee to reform the global standards for bank regulation and supervision to improve financial stability by raising the quantity and quality of capital required, creating new global liquidity standards, fundamentally changing risk modelling processes and taking certain other related actions. As a result, many complex rules governing capital, liquidity, trading operations, derivatives, and securitizations have been adopted since the crisis. Furthermore, some institutions were subject to particular scrutiny and regulation due to their size, complexity, and interconnectivity.

There is a strong argument that reforms since the 2008 financial crisis will make the banking system more resilient. However, the implementation of these rules has also created costs for the banking system and the broader economy, leading to fundamental changes in bank balance sheets and business models, and arguably how a bank should be governed and run. The structure of financial markets has also been impacted by the reforms, with resulting changes in their liquidity, efficiency and effectiveness. While in many cases changes to the business models of banks were intended, in other areas it is likely that the cumulative impacts go beyond those intended and may, negatively affect the functioning of the financial system. The potential for this is fueled by the multiple layers of regulation, the analysis of which has frequently been performed, at least initially, in isolation.

The scale and scope of regulatory reform has led to calls for regulators to take stock of the cumulative effects of these changes and to assess whether unintended, undesirable consequences may mean that a recalibration of regulatory changes is required. Both market participants and some officials have raised potential concerns over the calibration of reforms. Calibration of both individual reforms (e.g. the overall level of leverage ratio requirements) and the combined calibration of reforms (e.g. the interaction between risk-sensitive capital ratio requirements and risk-insensitive leverage ratio requirements) have come into question.⁶

In particular, there is a concern among some observers that the ongoing Basel workstreams will significantly add to banks’ capital requirements, may exceed appropriate levels, and counter some of the national and regional initiatives to meet G20 growth commitments.

We believe that the need for recalibration of the reforms analyzed in this paper is inevitable when making such sweeping and detailed changes to the rules for a huge and complex industry on a global basis.

The Basel Committee set up a workstream in its 2015–16 plan to examine the “interaction, coherence, and overall calibration” of its reforms, and the Financial Stability Board (FSB) has undertaken similar efforts. This report is in large part intended to help inform those organizations as they weigh these issues and, ultimately, consider remediation of problems that are uncovered. We do this primarily by pulling together and interpreting the large and growing base of research from official bodies, academics, think tanks, and others, as well as the many comments and analyses provided by participants in the financial sector. Although significant changes and additions have been made since the initial Basel III rules were published, many of the studies are based on only the initial set of Basel III rules (and do not include the ongoing or recently finalized workstreams) these initial proposals and therefore likely underestimate the magnitude of the ultimate impacts.

⁵ G20 Leaders (2009)

⁶ Jones (2016), Kutler (2010)

Our primary focus is examination of the impact of the global rules already recommended by the Basel Committee since the financial crisis and of the likely impact of ongoing workstreams that the committee intends to conclude in 2016. The Total Loss Absorbing Capacity (TLAC) rules proposed by the FSB are also included in the analysis, given their close ties to the Basel Committee's capital and liquidity standards. Additionally, stress testing requirements are discussed at a high level, but not analyzed at a jurisdictional level, except in a few cases where interactions are noted between Basel requirements and national stress tests. Exclusion of stress tests from the scope of this report should not be construed as an indication of their impact, as they are often very important.⁷ In general, this report does not include a detailed analysis of specific jurisdictional implementations of Basel reforms or bank structure regulation. Please refer to Appendix A for a brief summary of rules included in this study.

In order to understand how Basel reforms impact banks and how these effects flow down to the customer, it is important to consider internal bank decision-making processes.

BANK DECISION-MAKING PROCESSES

There are a number of qualitative and quantitative considerations that should be taken into account when assessing the impact of regulatory reforms. These include:

Capital and liquidity allocation and pricing within financial institutions. Accurate analysis of the impact of financial reforms on end users requires an understanding of how financial institutions make internal allocation and pricing decisions about capital, liquidity, and other scarce resources, as these have a direct effect on the supply and price of the services they offer. The aggregate effect of the decision processes of these intermediaries determines the provision of credit and other services to the wider economy. Therefore it is critical to understand these allocation decision processes as policymakers set capital, liquidity, and other regulations. Good cost-benefit analyses, for example, depend on an accurate reading of the actions banks and other financial institutions will take in response to new regulations.

In practice, regulatory requirements are effectively replacing internal and rating agency criteria as the drivers of internal pricing and allocation mechanisms. The reason for this is simple; regulations are now virtually always considerably more constraining than the other methodologies in terms of the capital and liquidity they require. This reflects a considered decision by policymakers globally that the economic externalities of financial crises require that banks maintain more capital and liquidity for society's benefit than they would choose to for internal reasons or as a result of demands from their shareholders and funders.

Thus, in practice, regulatory choices about capital and liquidity rules and in particular, the risk-sensitivity or lack thereof will affect choices about the pricing and availability of credit and other services in quite specific ways throughout the organization, as individual units and entire organizations determine how to allocate their capital according to their strategic priorities and whether the business they have traditionally done can still provide a reasonable return on capital under the new capital and liquidity requirements. In a context where capital is a scarce, inelastic resource, the internal allocation of capital is the primary constraint on business models.

Policymakers have made clear that they do not wish to dictate business models, except to eliminate a few that they deem particularly dangerous, but the practical effects of various regulations and their interactions do, in fact, substantially influence business models for the future. This point is critical to understanding the future impact of Basel reforms.

⁷ Anderson (2016).

SUMMARY OF FINDINGS

This subsection summarizes the effect of regulatory reforms on bank lending and capital markets.

IMPACT ON BANK LENDING

Reforms impose additional expenses for banks through an increase in funding costs (driven by higher capital and liquidity requirements). These higher costs may then be passed through to the wider economy through two key impacts on end users: increases in the price of credit and reduced loan volume.

INCREASED PRICE OF CREDIT

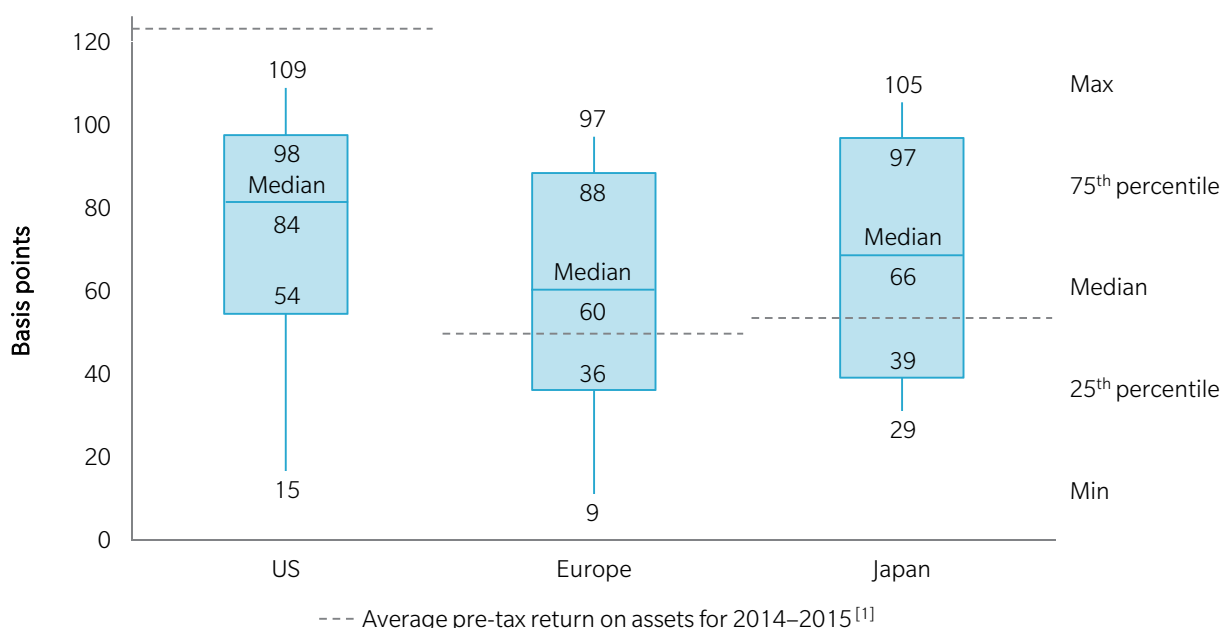
As banks raise capital and TLAC levels for the same amount of risk, their total cost of funding goes up (while Modigliani-Miller theorem states that higher capital requirements would not increase a bank's funding costs, in Section 2 we discuss why these assumptions do not fully hold and banks experience higher funding costs). Given shareholder expectations for market-consistent returns on capital, banks will be faced with a choice between exiting certain business lines and passing on some or all of their increased funding costs by raising margins and fees for banking products. Pricing may impact some market segments more than others, creating an uneven distribution of these costs. This is one of the main transmission channels through which the changes in capital, liquidity, and TLAC regulations impact the wider economy.

We reviewed over 20 studies across multiple geographies to estimate the impact of Basel reforms on the price of credit. These academic, official, and industry group studies analyzed the overall effects of the main Basel capital and liquidity reforms, without consideration of the many workstreams that some industry observers lump together as "Basel IV", such as the revisions to the standardized approach for credit risk, and included both theoretical estimates and analysis of actual outcomes of the Basel reforms. These studies are discussed in Section 4 and in Appendix B. Our analysis of these studies, in Figure B, that, when put on a common basis and with updated assumptions on total capital requirements, estimates of the gross impact of the new Basel capital and liquidity requirements on funding costs in the US range from 15–109 bps, with a median increase of 84 bps. The impact in Europe ranges from 9–97 bps, with a median increase of 60 bps. The estimated increase in funding costs in Japan ranges from 29–105 bps with a median increase of 66 bps. Even with the larger basis point effect on the US, the higher funding costs are likely to have a relatively larger aggregate impact in Europe and Japan, where the average pre-tax rates of return on assets are lower than in the US and the banking systems are much larger in comparison to the size of their economies.

The magnitude of impacts is driven largely by the differences in gap between starting and target capital ratios (larger for US and Japan than Europe) and differences in RWA density (higher RWA/Total Assets ratio in US than in Europe and Japan), as will be discussed in Section 4. Additionally, the impacts discussed in this report may vary within more specific jurisdictions than described here (for example, within Europe).

These results are based on a series of assumptions we made to put the studies on a common basis and to reflect the aggregate impact of the relevant reforms on capital levels. This analysis does not normalize for the effects of historically unprecedented monetary accommodation and consequent low rates, which have different impacts in different jurisdictions. Likewise, significant changes and additions have been made since the initial Basel III rules were published, therefore many of the studies are based on only the initial set of Basel III rules (and do not include the ongoing or recently finalized workstreams) and will likely underestimate the magnitude of the ultimate impacts.

FIGURE B: GROSS IMPACT OF REGULATORY REFORMS ON BANK FUNDING COSTS



[1] Average of 2014–2015 return as (total net income before taxes)/(total assets); Source: SNL, Oliver Wyman analysis
Source: Oliver Wyman analysis. Refer to Section 5 and Appendix B for further details and references

The estimates would rise if they were to take into account two key recent regulatory changes: ongoing Basel reforms (likely to result in RWA increases) and TLAC.⁸ Additional funding costs are expected to be driven by the most recent Basel Committee reforms (revisions to the standardized approach to credit risk and operational risk, FRTB, limitations on the use of internal models and the imposition of capital floors on the output of models, etc.). Some studies estimate that these additional changes will increase average bank RWAs, with a lower bound estimate of 10–30% for the proposals as envisioned at the times of the various analyses and significantly higher for some specific financing activities⁹. (We refer to this as a lower bound, as many of the studies analyze only a subset of the changes.) Similarly, bank funding costs are expected to be impacted by TLAC requirements, which have been estimated to increase lending rates by 5–15 basis points, according to the Experts Group for the FSB (2015). Some have argued that TLAC requirements are mis-calibrated, as will be discussed further on: for the US, a 16% TLAC requirement would produce total loss absorption capacity that is “4.4 times greater than the average losses projected for US G-SIBs under the Federal Reserve’s *severely adverse scenario* for the 2014 Dodd Frank Annual Stress Testing (DFAST) stress testing and Comprehensive Capital Analysis and Review (CCAR) exercise.”¹⁰ The ongoing nature of Basel work makes it more difficult to estimate the total impact of reforms than is true for completed regulations.¹¹

The differences in estimates of total impact among the various academic and industry studies are driven by several factors. First, studies differ in the scope of reforms analyzed: the majority of studies examine only increases in capital ratios, while some studies also consider liquidity reforms and other factors. Second, methodological

⁸ Covered in more detail in Section 4.

⁹ Dawn (2015), Durand (2015), Keenan and Spick (2015), KPMG (2015), Macquarie Equities Research (2016), The Economist (2015), Turner (2012), Graham, Li, and Kruse (2016), IIF (2016), BCBS(2015f), ISDA, GFMA, and IIF (2015), ORX Association (2016), J. P. Morgan Cazenove (2015), Oliver Wyman and Morgan Stanley (2015), The Association of German Public Banks (2016), Risk Control (2016), McKinsey (2015)

¹⁰ SIFMA (2015a)

¹¹ Brooke et al. (2015), SIFMA (2015a), EBF (2015), EACB (2015)

approaches vary significantly, with dynamic stochastic general equilibrium (DSGE) or generalized method of moments (GMM) estimations tending to estimate lower impacts of the reforms. See Section 4 for more details.

It is important to note that some of the lending rate increases discussed above could be offset by a number of factors. Banks can reduce expenses, decrease expected credit losses through tighter loan conditions, restructure businesses, and take other capital actions. Additionally, there are a number of external factors that could mitigate the impacts of reforms, including inherent offsets among reforms, changes to monetary policy, and reductions in the return on equity required by equity holders due to the increased safety of the banks. The few studies estimating the impact of these offsetting actions are discussed in further detail in Section 4.

DECREASED SUPPLY OF CREDIT

As a result of higher capital ratios, other technical changes increasing capital requirements, and changes in the definition of capital, banks may increase their credit standards and reduce their loan volumes, thus decreasing the amount of capital they have to hold for higher-risk loans. Additionally, customers could respond to higher loan rates by reducing their demand for credit.

The literature we reviewed suggests that, as a result of a 1% increase in required capital ratios, lending volume in OECD countries would decrease by 0.3% to 8%, depending on the underlying macroeconomic model used, with an average decline of 2.6%. Since the impact is not necessarily linear, we cannot estimate the impact of the cumulative increase in capital requirements without having access to the models used in the literature.

Overall, the decrease in availability of bank credit for both corporate end-users and retail customers, either due to higher prices or lower supply, could impact the cost of capital for these end users and result in potentially lower output.

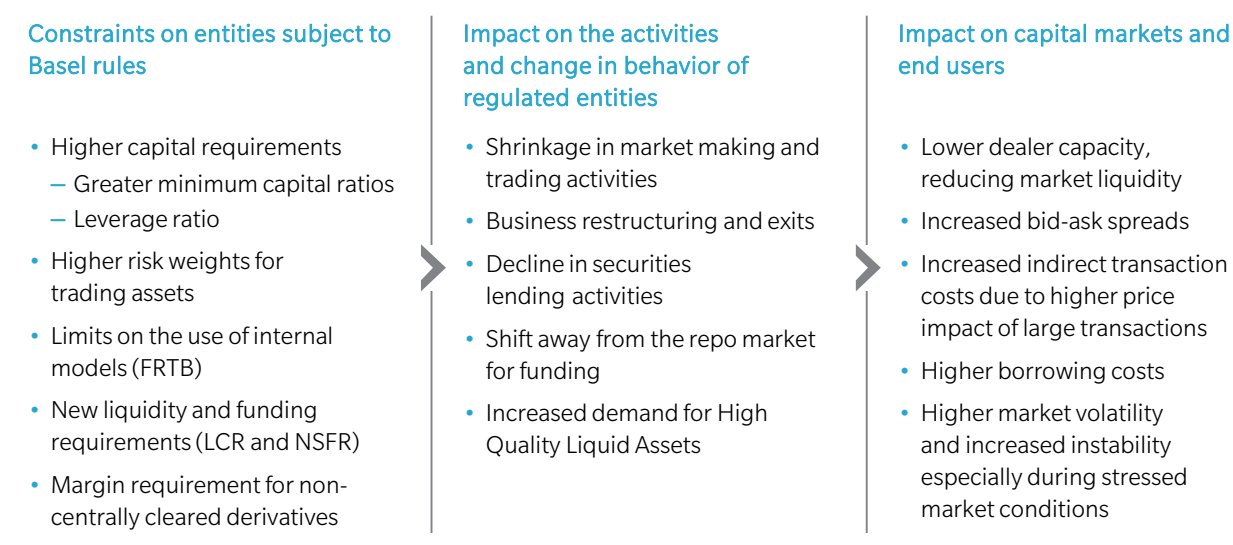
DISTRIBUTIONAL IMPACTS

Additionally, there are a number of distributional consequences of the impact of these reforms. First, corporate customers are likely to be impacted more than households, both through increased loan rates and in declines of loan volumes. Small and Medium-sized Enterprises (SMEs) are expected to be particularly impacted as they are more dependent on bank borrowing than larger firms. Second, banks will be affected by reforms in different ways based on their geographic location, current practices (e.g. use of internal models), and business mixes. Finally, emerging markets are likely to be impacted differently than developed markets. These issues are discussed in Section 4.

CAPITAL MARKETS

We expect market changes caused by recent regulatory reforms to flow through to end users, resulting in a decrease in market liquidity and an increase in market volatility.

FIGURE C: OVERVIEW OF REGULATORY IMPACTS ON CAPITAL MARKETS



CHANGES IN MARKET STRUCTURE AND BEHAVIOR OF MARKET PARTICIPANTS

Banks play a central role as intermediaries to facilitate liquidity in the markets through their market-making activities. However, increases in capital and liquidity requirements have pressured the market-making business model by increasing the cost of providing intermediation services and driving down profitability. In low margin market making activities, the combined Leverage Ratio and NSFR costs are estimated to impact bank costs in the 60bps–110bps range for low margin market making activities.¹²

Banks' balance sheets supporting traded markets have contracted by 50% in RWAs on a Basel III adjusted basis, implying 25–30% in terms of total (non-risk weighted) balance sheets, since 2010¹³. Table B shows historical and forecasted balance sheet reductions by product. This points to a significant reduction in dealers' market making ability, potentially leading to a major impact on market liquidity.

TABLE B: BALANCE SHEET REDUCTIONS, 2010–15 (% CHANGE)

PRODUCT	2010–15	NEXT 3–4 YEARS
Repo	Down ~50%	Down ~10%
Prime	Up ~20%	Flat
Bonds, FX & commodities	Down ~25%	Down ~10%
Structured & securitized	Down ~20%	Down ~10%
Listed, flow & cleared products	Down ~20%	Down ~5%
Issuance & advisory	~ Flat	Down ~5%
Total	-25% to -30%	-5% to -10%

Source: Oliver Wyman and Morgan Stanley (2016)

While this situation may be indicative of a transition to a “new normal” in financial markets, and likely reflects additional factors beyond regulation, there has been little or no academic study so far on where the new

¹² AFME (2016)

¹³ Oliver Wyman and Morgan Stanley (2016)

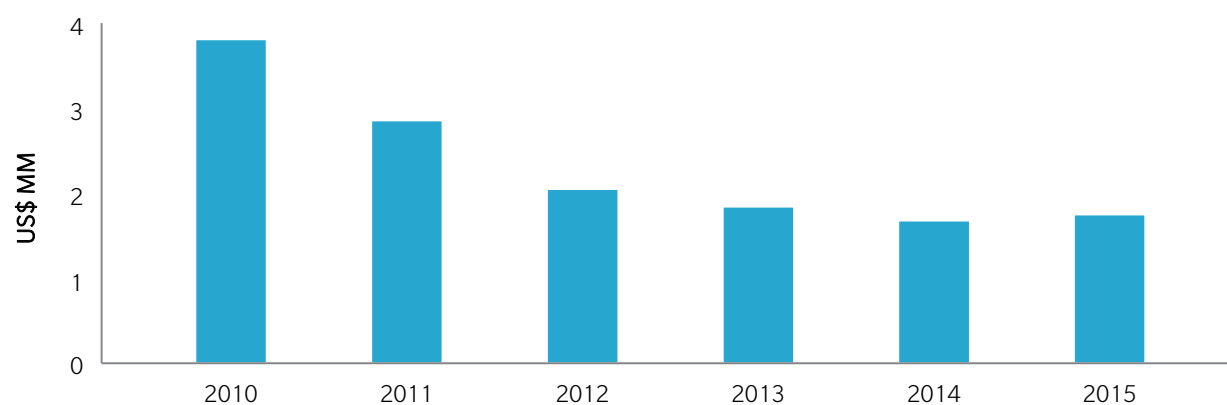
equilibrium lies and how markets and central banks can avoid any bumps in the road that may lead to more serious systemic issues¹⁴.

INCREASE IN TRANSACTION COSTS

As a result of changes in dealer activity, end users may pay more to trade due to increased bid-ask spreads, have lowered ability to transact large trades as suggested by decline in average trade size, and take longer to complete transactions.

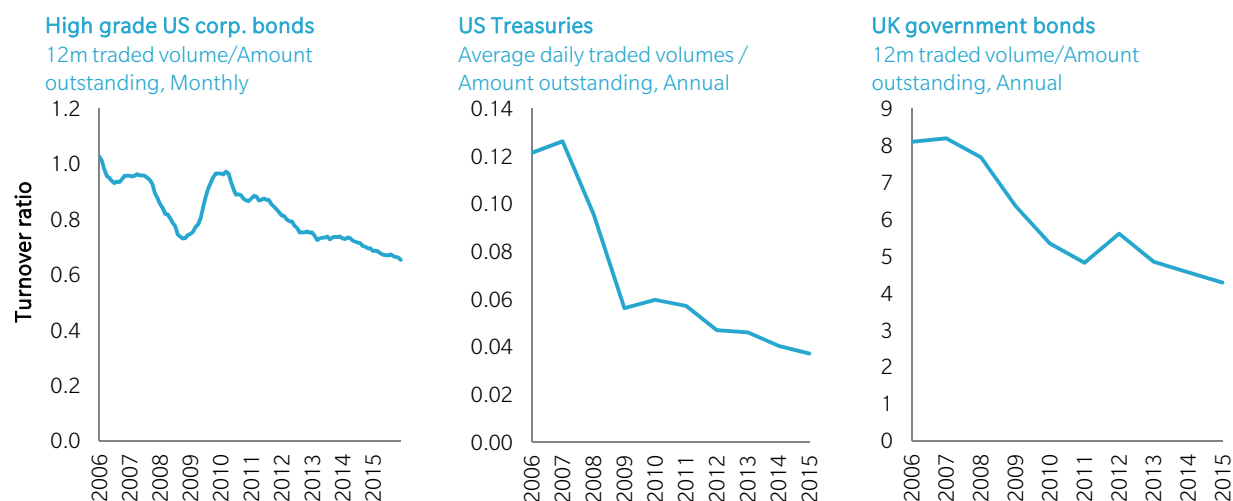
Data on trade sizes does suggest that the ability to perform large transactions may have decreased. For example, the average trade size for US treasuries, one of the most liquid markets, has shown a marked decline, more than 50 percent, (see Figure D) since 2010. Turnover ratios have also fallen significantly (see Figure E).

FIGURE D: AVERAGE TRADE SIZE IN US TREASURIES



Source: Trax (from GFMA, IIF and PWC (2015))

FIGURE E: TURNOVER RATIOS

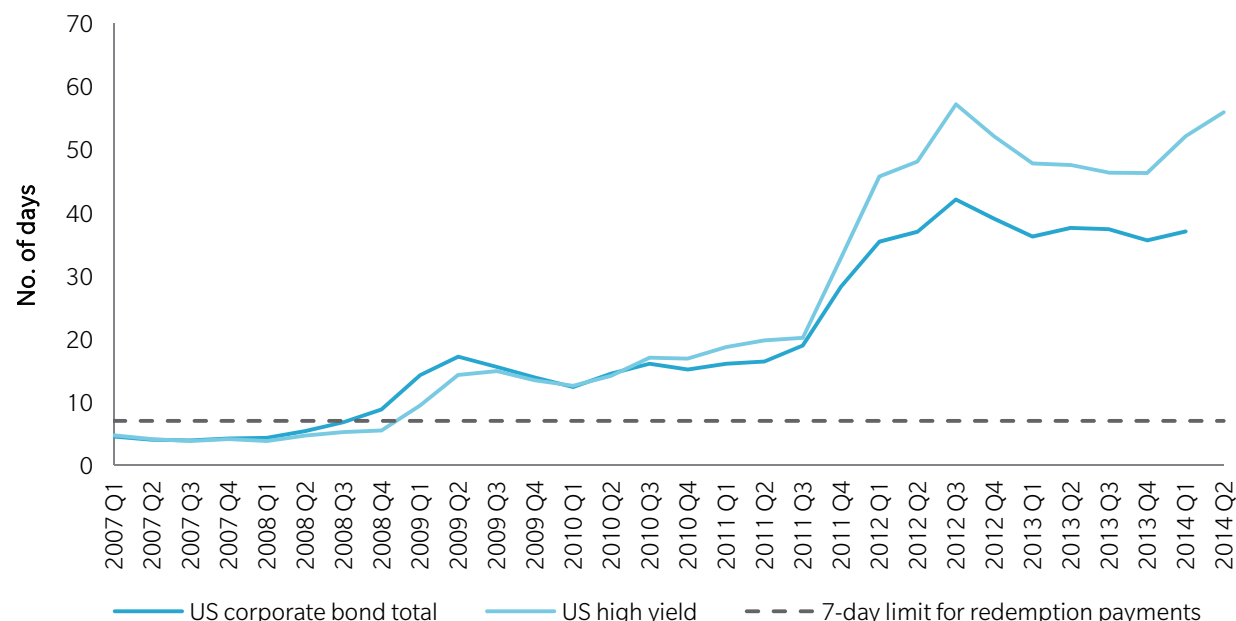


Source: MarketAxess, SIFMA, UK Debt Management Office

¹⁴ Caruana, Kay, and Tucker (2016)

Analysis performed by the IMF in 2014 shows that the number of days required for liquidation of a US credit mutual fund has increased significantly post crisis (see Figure F)¹⁵. It is estimated that 50–60 days would be required for liquidation of a high yield fund, compared to the 7 day limit for redemption payments.

FIGURE F: NUMBER OF DAYS FOR FULL LIQUIDATION OF US CREDIT MUTUAL FUNDS AND ETFs



Note: The number of days to liquidate is the ratio of assets of mutual funds and ETFs (exchange-traded funds) per daily dealer inventories. Because there are no data for US high-yield bond dealer inventories before April 2013, the high yield line assumes a constant ratio of this amount to total corporate bonds before this date

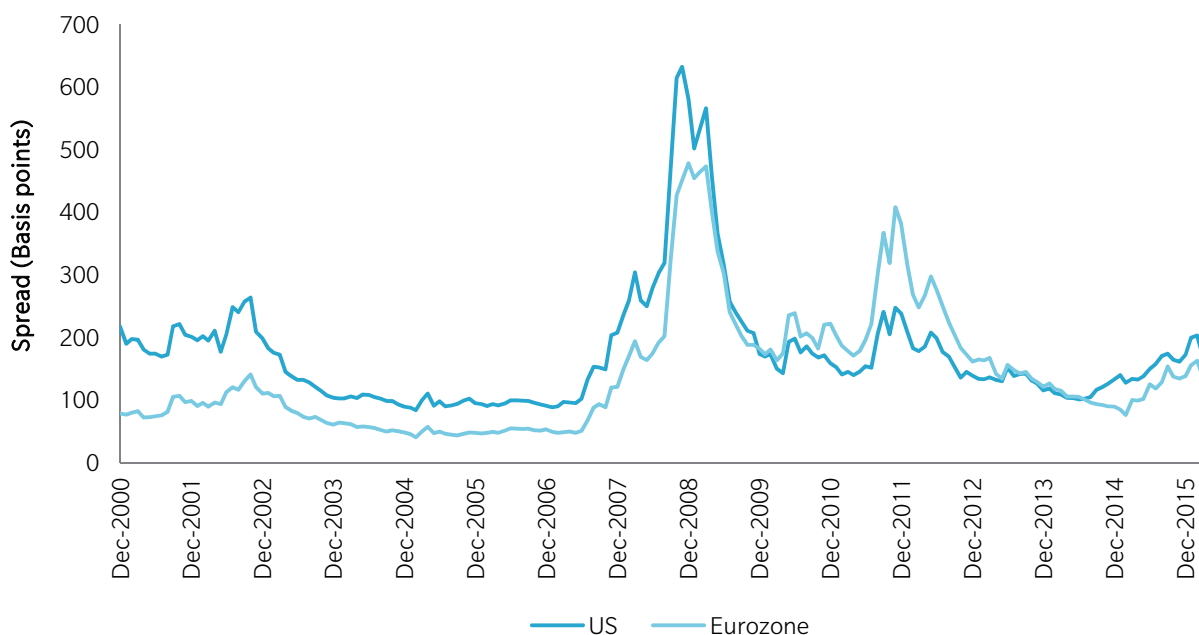
Source: EPFR Global; Federal Reserve; and IMF calculations (from IMF (2014))

IMPACT ON SPREAD

With a decline in market liquidity, investors will demand a greater “liquidity premium” on bond spreads. As a result, corporates will find it increasingly expensive to obtain funding through the capital markets. As shown in Figure G, spreads on US and Eurozone investment grade spreads have increased significantly since 2013. Although there has been a reversal in this trend in recent months, spreads remain substantially elevated compared to the pre-crisis period. This may be driven partially by lower market liquidity.

¹⁵ IMF (2014)

FIGURE G: SPREADS ON INVESTMENT GRADE CORPORATE BONDS



Source: Barclays

INCREASE IN MARKET VOLATILITY

The speed and extent of price movements in the capital markets is influenced by market liquidity. A large number of participants with an ability to transact quickly and efficiently can ensure that price movements not aligned with the market consensus are quickly nullified. Further, in a liquid market with a constant flow of transactions, large-block trades would have a limited impact on price, resulting in lower price volatility.

There have been incidences of extreme movement in prices that may indicate structural illiquidity in some markets. Examples of this include the “Taper Tantrum” in US treasuries in 2013, and the extreme fluctuation in European sovereign bond prices in the first half of 2015:

- In October 2014, following negative news on the US economy, 10-year US Treasury yields dropped by 37 bps (“statistically 7 to 8 standard deviation move, an event that is supposed to happen once in every three billion years or so”¹⁶), followed by a rebound to roughly the previous level, within a period of minutes. This represented a very large move by historical standards in that market in a very short space of time.
- In 2013, in response to news that the Fed might taper off its purchase of bonds in the markets more quickly than expected, there was a rapid decrease in the price of governments bonds, which then impacted prices of other bonds priced relative to government bonds.
- In 2015, when the Swiss National Bank gave up its policy of capping the Swiss Franc – Euro exchange rate, the value of the Swiss Franc jumped by 30% within the first thirteen minutes of trading before partially reversing the move over the course of the day. Some market observed believe that the extent of price movement would have been more subdued in a more liquid market.
- European sovereign bond prices fluctuated significantly in the first half of 2015. For instance, German 10-yr government bond prices moved by 7–8% from peak to trough.¹⁷

¹⁶ J.P. Morgan Chase & Co. (2015)

¹⁷ Elliott (2015)

- In 2015, rates in USD interest rate swaps dropped suddenly below corresponding Treasury yields, for the first time in more than 5 years.
- In February 2016, Portuguese sovereign debt experienced a dramatic increase in yields to over 4.5%, the highest since Portugal's bailout exit in May 2014, despite stable economic fundamentals

OFFSETTING FACTORS

A number of factors may partially mitigate the impact of regulatory reform on end users. These include the expansion of alternate providers of liquidity such as smaller dealers, hedge funds and high frequency traders as well as growth in electronic trading. However, there are substantial limits to the ability of these alternative providers and approaches to replace the reduced market making capacity of the major dealers. It should also be noted that electronic trading platforms and high frequency traders cover only the most liquid instruments, representing a fraction of the number of instruments issued by corporates and sovereigns.

Additionally, the impact on capital markets has not yet fully materialized and there is often limited, quantitative evidence available to estimate the effects to date. The full impact has not yet materialized for at least the following reasons:

- Finalization of rules and full implementation of regulations is still in progress. Some of the key regulations have not yet been implemented, are being phased in, or are still very new. Bilateral margin requirements, the Net Stable Funding Ratio and the Fundamental Review of the Trading Book, for example, have not yet been incorporated into national rules.
- Unconventional monetary policies followed by many central banks have temporarily inflated market liquidity and likely reduced volatility. These policies are not sustainable in the long run, so the benefits to market liquidity should be temporary. The potential impact on the liquidity when these policies revert to normal could be dramatic for the market.
- Banks are still in the process of determining how to revamp their approaches in response to regulations, creating a delay in the resulting impact on market structure and liquidity.
- Banks and large securities dealers are phasing in their increases in pricing and reductions in the supply of services, for both competitive reasons and as a result of internal structural processes that slow response times. It should be noted that these moves could increase homogeneity of bank structures and concentrations of risk, possibly leading to higher systemic risk.
- Market participants have adjusted to the new market conditions in a number of ways, including investors breaking up trades into smaller pieces and lengthening entry or exit timeframes, but this may not be sustainable in the long term and may exacerbate market illiquidity, volatility, and stability during stress conditions.

Any reversal of these trends would likely increase other measures of illiquidity in markets, meaning that underlying market liquidity may be worse than it currently appears.

EXAMPLES OF ISSUES WITH BASEL REFORMS

A number of concerns have been raised by academics and market participants about the calibration and implementation of the reforms. These generally fall into four types of potential issues: 1) potentially inconsistent set of rules; 2) potentially mis-calibrated rules; 3) potential duplication or interaction of rules; and 4) potential unintended consequences of rules.

The table below summarizes the issues discussed in Section 1 at a high level. Refer to that section for more detailed discussion.

TABLE C: SUMMARY OF POTENTIAL ISSUES WITH BASEL REFORMS

TYPE OF POTENTIAL ISSUE	POTENTIAL ISSUE	DESCRIPTION
Consistency	Conflicting incentives of the leverage ratio versus other capital and liquidity ratios	Risk insensitive leverage ratio produces divergent incentives for the composition of a bank's portfolio from the incentives produced by risk-sensitive capital requirements
	Inconsistency of incentives created by structural and liquidity reforms	Segregation of businesses due to structural reform could impact consolidated entity's stable funding, and could be creating conflicting incentives for banks
Mis-calibration	Calibration of capital ratios	Limited consensus on optimal levels, especially in light of expected RWA increases from current workstreams, at both a consolidated and granular (activity) levels
	Calibration of TLAC	The impact of TLAC requirements including internal TLAC arrangements should be assessed further to ensure appropriate calibration in the context of the cumulative impact of TLAC, capital requirements, and expected RWA increases from current workstreams
	Calibration of the leverage ratio	The LR could be the binding constraint for a large share of banks, potentially going beyond the intention of many that it be a backstop; calibration needs also to be assessed at the activity level and how it may impact strategic decisions, as, for example, the LR may be the binding constraints for fully collateralized trades and market making on government bonds
	Calibration of LCR	Assets included in and excluded from HQLA definition may be mis-calibrated based on underlying risk
	Calibration of sovereign debt weights	Standardized zero risk weight for sovereign debt underestimates underlying risk in varying degrees
	Calibration of mortgage weights	Mortgage risk weights could be misaligned with underlying risk factors
	Calibration of credit conversion factors (CCF)	Calibration of CCF for certain exposures (e.g. off-balance sheet exposures, trade finance, infrastructure) could be too punitive compared to historical experience
	Calibration of Standardized Approach leading to reduction in risk sensitivity	Calibration of proposed SA measures reduces risk sensitivity for some asset classes and may create distorting incentives; may also, in combination with capital floors, duplicate the "backstop" role of the leverage ratio
	Calibration of NSFR	NSFR requirements may impose unnecessarily high costs on certain derivative trades and linked transactions

TYPE OF POTENTIAL ISSUE	POTENTIAL ISSUE	DESCRIPTION
Duplication or interaction of coverage	NSFR, LCR, and US G-SIB buffer (addressing maturity mismatch and short-term wholesale funding)	US G-SIB buffer, and potentially the inclusion of G-SIB in CCAR addresses liquidity and funding issues already addressed by NSFR and LCR
	Capital floors	Capital floors may duplicate “backstop” role of the leverage ratio and are not consistent with robust qualification test for internal models
	Step-in risk	Proposed conceptual framework for step-in risk could be duplicative of other measures that have already addressed the underlying issue, e.g. prohibition of sponsor support for money market funds
	CET1 ratio, leverage ratio, and stress testing	CET1 ratio, leverage ratio, and stress testing may each be a binding constraint depending on the year, which may create complexity in banks’ determination of their binding constraint and cause inconsistency in internal capital allocation and internal transfer pricing mechanisms within banks
Unintended consequences	Shadow banking	Regulatory reforms could push an increasing amount of financial activity to a less regulated “shadow banking” sector, thus potentially increasing systemic risk
	Procyclicality	Countercyclical capital buffer may not sufficiently address cyclicity and could potentially be procyclical in practice
	Leverage ratio incentives for deposits (held at central banks)	Leverage ratio creates a disincentive for custody (and other) banks to accept cash deposits, especially during a “flight to safety” in a crisis; leverage ratio may also create other dis-incentives for products or activities, such as OTC clearing
	Impacts of liquidity reforms on overall market liquidity	While liquidity reforms improve liquidity at the individual bank level, they may lead to a decline of overall market liquidity
	Impacts on market structure	Reforms create incentives for alterations to market structure, such as market or client exits, possibly limiting provision of financial services
	HQLA Alternative liquidity approaches (ALA)	Low supply in government debt in some geographies has led to ALAs that are not fully linked to central bank liquidity policies, which may reduce central bank ability to respond to a crisis
	Distributional consequences	Reforms will impact some products or services more than others and may consequently impact end-users in ways that were not intended. For example, corporate customers and SMEs will be more impacted by lending rate increases, primarily due to capital weight differentials

The number of concerns raised above point to the fact that even though regulatory reforms likely have had substantial benefits for society in terms of increasing financial stability, there is potential for improvement. It is now up to regulators to review the calibration and consistency of reforms and make a well-informed decision on whether the current set of reforms can be improved.

Further research will be required to fully understand the impact of reforms. First, additional rigor could be applied to evaluating costs and benefits of financial reforms at a higher level of granularity: for example, the impact of liquidity reforms on a trading desk or product level. It will be critical to understand reforms’ impact on different segments of the market to identify potential areas of undue burden or impairment of the efficient functioning of the market. Second, the empirical research to date has focused primarily on the impact of capital, and to a lesser extent,

liquidity regulation and the joint impact thereof on banks. Other reforms, for example margin requirements, have received less attention and should be evaluated further. However, until all these reforms are finalized and fully implemented, the full impact cannot be determined, though it would be desirable, as a matter of policy, to address some of the perceived negative impacts. Third, a holistic study of the RWA increases that could result from the most recent set of reforms is necessary. Fourth, the interactions among reforms will require additional attention to understand potentially competing incentives or countervailing impacts. This will become increasingly important as the reforms currently under revision are implemented. Finally, study of the impact of reforms across multiple jurisdictions would also be beneficial, as research to date has focused primarily on developed markets, especially the US and Europe.¹⁸

The rest of the report is structured as follows:

- In Section 1, we set the scene by providing an overview of the Basel Committee's post-crisis agenda and highlight the scope of issues covered in this report.
- In Section 2, we examine the important question of how the impact of the reforms can be measured, particularly its effects on bank lending and financial markets. In particular, we investigate the relevant measurements of costs and benefits.
- In Section 3, we discuss the impact of post-crisis regulatory initiatives on the internal capital and liquidity allocation and pricing mechanisms at financial institutions.
- In Section 4, we discuss the overall impact of the post-crisis Basel Committee initiatives on the lending channel.
- In Section 5, we discuss the overall impacts of the post-crisis Basel Committee initiatives on capital markets including constraints on financial markets liquidity.
- In Section 6, we focus on the overall coherence of the post-crisis Basel Committee initiatives and TLAC and the potential for inconsistency, mis-calibration, and unintended consequences.

¹⁸ BCBS (2016h)

1. BASEL COMMITTEE'S POST-CRISIS RESPONSES

The intent of the Basel Committee and the FSB is to reduce the frequency of and damage from financial crises while minimizing the cost in non-crisis years that results from the added safety measures. This concept of a trade-off between safety and economic efficiency is a crucial one, because the core Basel III reforms raise the funding and operational costs for the affected financial institutions and have significant impacts on end-users. There are some offsets that come from the benefits to the financial institutions themselves of greater safety and from potential changes to their cost structures, but a substantial portion of the costs are likely to flow through to customers and raise the cost of funding to the economy.

There are other important effects that are examined in this paper, but the most crucial impacts are on (1) lending conditions and (2) the liquidity, stability, and overall functioning of financial markets, given the sheer size of these factors for the economy as a whole. This study is focused on estimating the impact of the following reforms:

TABLE 1.1: BASEL III REFORMS AND ONGOING WORKSTREAMS¹⁹

BASEL III	ONGOING AND RECENTLY COMPLETED WORKSTREAMS
- Quantity and quality of capital (minimum capital requirements and composition thereof) - Regulatory buffers (capital conservation buffer and countercyclical buffer) - Counterparty credit risk capital requirements (Standardized approach for measuring counterparty credit risk exposures, margin requirements) - Leverage ratio - Liquidity reforms (Net Stable Funding Ratio (NSFR) and Liquidity Coverage Ratio (LCR)) - Measuring and controlling large exposures	- Standardized approach for credit risk, and operational risk - Capital floors - Constraints on use of internal models - Revised Leverage ratio - Interest rate risk in the banking book (IRRBB) - Fundamental review of the trading book (FRTB) - Securitization - Haircut floors for Securities Financing Transactions - Total Loss-Absorbing Capacity (FSB regulation) - Stress testing (primarily jurisdictional regulation) - Step-in risk

Note: See Appendix A for more detail on regulations/standards covered within scope of this report.

Evaluating regulatory impacts on credit pricing and availability and on the extent to which financial institutions provide market liquidity, and at what price, requires an understanding of how banks and securities dealers allocate capital, liquidity, and other scarce financial resources within their institutions. This is an important area of economic analysis that has largely been neglected by academia and many policymakers, so this paper will also extend the literature by describing these processes and some implications for judgments about the effects of regulation.

This report examines the important question of how the impact of the reforms can be measured. That is, what are the relevant measurements in terms of costs and benefits? The most critical of these measures boil down to two sets:

Effects on lending: changes in the price and supply of credit provided by financial institutions covered by the Basel rules. In addition, tightened rules on these institutions compared to other credit providers could produce a potential for concentration of exposures in parts of the financial sector that are not regulated or regulated only lightly (often referred to as “shadow banks”), which has important implications in its own right.

¹⁹ List of issues covered by this report is non-exhaustive of the full list of Basel reforms since the crisis

Effects on capital markets: changes in bid-ask spreads, price movements due to large purchases/sales, overall volatility in both normal and abnormal times, changes in pricing for new issuances, and changes in which clients are served with which products. These have implications for market structure and market participants.

This report considers the findings of studies by academics, officials, and other industry observers, supplemented with additional analysis where market data is available. Additionally, quantitative studies conducted by the Basel Committee and by the industry are also discussed, as relevant. Studies published to date have been primarily focused on the original Basel III reforms, and as such the baseline estimates discussed in this study are focused on the impact of reforms such as increases in capital and liquidity requirements. The specific studies selected for this report are discussed in Section 3 and Section 5.

Critically, the studies described above omit an evaluation of ongoing Basel workstreams. Following the financial crisis of 2008, the BCBS developed the Basel III framework but indicated that further work was required to help develop the resiliency and the strength of the financial system, particularly in the event of financial stress. Basel set up workstreams to address areas of concern, some of which are still outstanding, and leveraged QIS data and industry comments in the development of the final rules. Broadly, the initiatives seek to not only better account for risk in the financial system, but also aim to improve simplicity and comparability of regulation, particularly through adjustments to the standardized and internal modelling approaches.

It is important to note that the Group of Central Bank Governors and Heads of Supervision (GHOS) has stated that the Basel "Committee will focus on not significantly increasing overall capital requirements."²⁰ While it is not the stated intent of the regulators to substantially increase capital requirements in aggregate across banks, but rather to improve identification of risks and reduce variability of measures across banks, ongoing Basel workstreams will have impacts on lending and capital markets channels beyond the effects of other Basel III reforms. In fact, these ongoing workstreams are expected to increase, or "inflate", banks' RWAs by revising the approach to calculation of RWAs and, consequently, increase capital requirements.

Quantifying the impact of these ongoing and recently completed reforms is challenging, primarily due to the fact that calibration is not yet complete. For example, the calibration of the capital floors could range significantly and will interact with the final rule on the limitations on use of internal models.

The BCBS itself has conducted reviews of the estimated impacts of reforms such as FRTB. In a November 2015 impact analysis of FRTB, they noted that "compared to the current market risk framework, the proposed market risk framework would result in a weighted average increase of 74% in aggregate market risk capital charges (based on the sample of 44 banks)." In its latest study, IIF (2016) shows somewhat smaller estimates which point to an increase in market risk capital of 40–50% (if 100% of desk approvals given, otherwise, a larger increase) while ISDA, the GFMA, and the IIF found, in a joint study, that the proposed FRTB framework's capital charge using the SA methodology is 4.2 times the total market risk capital that firms were holding at that time, though the analysis was conducted prior to the January 2016 version of the market risk requirements. Estimates of operational risk RWA increases appear close to 60%: IIF (2016) indicates that the shift from AMA to SMA will produce a median increase of 60% in operational risk capital while ORX Association (2016) estimates that the mean change as a result of reforms will be a 61% increase of operational risk capital requirements.²¹

A number of other market participants and industry analysts have evaluated the impact of multiple reforms on banks. As discussed above, the exact impact of the reforms is not yet clear in part due to the fact that they have not all been finalized or implemented, leading to a wide range of estimates, which indicate that the lower bound of RWA inflation will be ~10–30%. The results are summarized in Table 1.2 below.

²⁰ BIS (2016m)

²¹ BCBS (2015f), Risk Control (2016), IIF (2016)

TABLE 1.2: SUMMARY OF STUDIES EXAMINING RWA INCREASES

SCOPE	STUDY	ESTIMATE	FOCUS
FRTB	IIF (2016)	Increase in market risk capital of 40–50%, if 100% of desk approvals (otherwise, a larger increase), or 4–5% increase in total capital ²²	
FRTB	BCBS (2015f)	74% weighted average increase of market risk capital or ~7% increase in total capital ²³	Sample of 44 banks
FRTB	ISDA, GFMA, and IIF (2015)	Capital charge is 4.2 times the total market risk capital that banks were holding in 2015, or ~42% increase in total capital ²⁴	Sample of 28 banks
Operational risk (AMA to SMA)	IIF (2016)	Median increase of 60% of operational risk RWA, or ~12% increase in total capital ²⁵	
Operational risk (move to SMA)	ORX Association (2016)	The mean change would be an increase of 61% for operational risk capital requirement, or ~12% increase in total capital ²⁶	
Operational risk, market risk, sovereign risk, credit risk RWA increases, Danish compromise, AFS exclusion	J.P. Morgan Cazenove (2015)	11.6% jump in RWAs	Europe's 35 biggest banks
Operational risk, credit risk, market risk, capital floors	Graham, Li, and Kruse (2016) (Autonomous)	Total RWA inflation of 18% (9% operational risk, 6% credit risk and 3% market risk), when a RWA floor of 60% is considered, RWA inflation increases from 18% to 23%	Leading 40 European banks
FRTB and standardized capital floors	Oliver Wyman and Morgan Stanley (2015)	10–30% increase in risk weighted assets (wholesale banking)	Wholesale banking
Revisions to standardized approach, Market risk – FRTB, operational risk – revisions to simpler approach, capital floors ²⁷	Keenan, O. and Spick, M. (2015) (Deutsche Bank)	Sector RWA inflation of 14% in baseline scenario	European banks
Risk floors and convergence of internal models (Internal Rating Based Approach) with the Standardized Approach (SA) – includes credit risk; FRTB	Macquarie Equities Research (2016)	More than 20% RWA inflation	ASEAN and multinational banks

²² Ibid²³ Assuming market risk RWA ~10% of total RWA²⁴ Ibid²⁵ Assuming operational risk RWA ~20% of total RWA²⁶ Ibid²⁷ Other measures such as Danish compromise are discussed

SCOPE	STUDY	ESTIMATE	FOCUS
Higher minimum leverage ratio, less reliance on internal models, revised standardized approaches, capital floor, stress testing, pillar 2, liquidity, disclosure ²⁸	KPMG (2015)	Increase of ~25% of CET1 capital	Major UK banks
Revised standardized approach for credit risk and operational risk, FRTB, capital floors, securitization, IRRBB	The Association of German Public Banks (2016)	Increase RWA levels by at least 30%	German banks
BCBS 347 proposals (Revisions to the Standardised Approach for credit risk)	Risk Control (2016)	39% increase in total bank capital	Swiss market
Revised standardized approach for credit risk, and operational risk, capital floors	McKinsey (2015)	Up to ~80% total RWA increase ("assuming risk weights of IRB portfolios to be floored at 80% of the STA"), and not including market risk RWA inflation	German banks
Revised standardized approach for credit risk, and operational risk, FRTB, capital floors	McKinsey (2015)	~50–100% increase ²⁹ in total RWA ("credit-risk RWA per portfolio may increase by 10 to 80 percent, while operational-risk RWA can more than double", "market risk RWA may increase by around 65 percent on average across the industry") ³⁰	European banks

As noted above, some studies estimate very significant increases of RWA requirements, ranging from ~10–100%. Most studies fall within the range of ~10–30%, which we estimate to be the lower bound of RWA inflation. However, this could prove to be an underestimate, pending final calibration of reforms, absent steps by the BCBS to mitigate the total impact. More detailed analysis commissioned by the Institute of International Finance and the International Swap Dealers Association, based on a detailed quantitative analysis of bank-level data, has reportedly shown even higher effects than the top of the 10–30% range. According to Politico³¹, the study shows increases in RWA of roughly 70% on average in some businesses. This would clearly have substantial implications for banks and their customers, although it is difficult to directly compare this to the 10–30% range for the industry as a whole shown in the studies below.

Banks could react to these reforms in two ways: raise their CET1 levels to offset the increase in RWAs, if they do not have sufficient CET1 already, or shrink the size of their RWAs through balance sheet reduction. We assume that banks increase their CET1 capital and show the estimated ranges of impact should RWAs increase by up to 30% as a result of these reforms, based on our estimate of lower bound of RWA inflation.

The biggest drivers of this increase in RWAs would be the revisions to the SA for credit risk, FRTB, the revised approach to operational risk, limitations on the use of internal models, and capital floors. In essence, the impact of these ongoing workstreams could be multiplicative (as discussed in Section 5) because these reforms will make it more expensive for banks to meet their capital requirements. The composition of a typical large bank's RWA, according to a 2016 IIF study, is shown below.

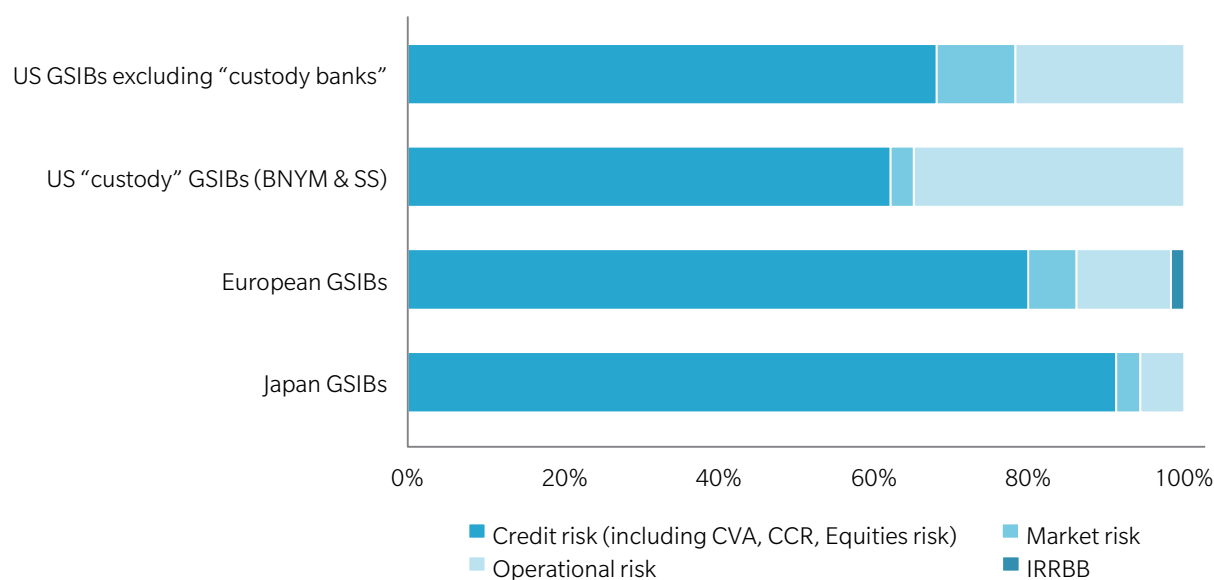
²⁸ Includes all regulatory requirements beyond Basel III

²⁹ Assuming market risk RWA ~10% of total RWA, operational risk RWA ~20% of total RWA, credit risk RWA ~70% of total RWA

³⁰ Does not reflect the potential impact of the application of the standardized approach for unapproved desks or as a floor

³¹ POLITICO Pro Morning Exchange, July 20, 2016

FIGURE 1.1: COMPOSITION OF A TYPICAL LARGE BANK'S RWA



Source: Trax (from GFMA, IIF and PWC (2015))

Credit risk. According to industry research, proposals dealing with credit risk are likely to account for the bulk of the potential increase in RWAs. This is intuitive, as credit risk RWAs represent the largest share of a bank's RWAs. In particular, credit weights of medium and large corporates are likely to see an increase. This may further increase the lending spread for corporates, as will be discussed in further detail in later in this section.

Operational risk. Changes to operational risk standards could also increase operational risk RWAs by a significant amount, second in scale to changes in credit risk RWA due to the fact that operational risk RWAs are the second largest share of bank RWAs for a typical bank (as per figure above). Estimates discussed above point to a ~60% increase in operational risk capital.³²

Market risk. Revisions to market risk standards will also increase RWAs. Estimates for the increase in market risk RWAs and, consequently need for capital, range between around 40% to well over 100%. The range is particularly wide as at the time of the writing of this report it was difficult to predict the impact of internal model eligibility tests (a number of banks have not been able to pass such tests across all desks, driving significant system redevelopment) and to quantify the impact on non-modellable risks (due to lack of data on such risks, which could result in a number of products being subject to relatively punitive stress tests). Additionally, there are likely to be distributional consequences for the increase in RWAs for market risk, as structured product, traded credit, and covered bonds are likely to be some of the hardest hit products.

Other Basel reforms. Limitations on use of internal models and the introduction of floors could have a significant impact on RWA, though impacts are likely to be highly uneven across the industry due to individual bank utilization of internal models (distributional consequences will be discussed later in this section). As banks move towards usage of standardized modeling approaches and apply floors, the risk weighted assets of banks using internal models are likely to increase significantly.³³

TLAC. In addition to the factors discussed above, TLAC is also likely to have a significant impact, particularly on the lending channel. For example, Deutsche Bank "expect[s] a direct impact of TLAC on the broader economy in terms

³² BCBS (2015f), Turner (2012), Macquarie Equities Research (2016), Keenan and Spick (2015), Risk Control (2016).

³³ Macquarie Equities Research (2016), The Economist (2015), Keenan and Spick (2015)

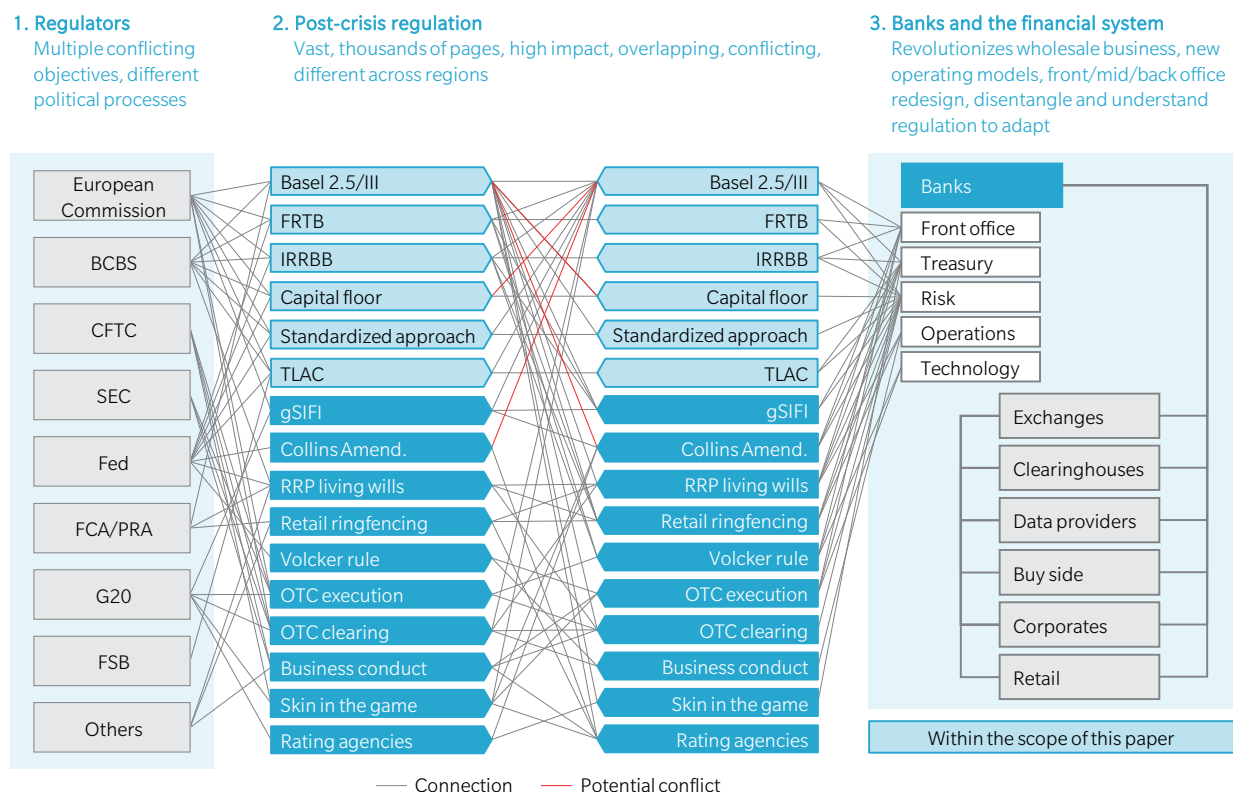
of increased funding costs and the resulting effect on lending availability and pricing.”³⁴ The extent of the impact is, of course, in question, and will be discussed in further detail in Section 4

The cumulative impact of all post-crisis Basel reforms and TLAC requirements on funding rates is not yet fully clear due to multiple factors as discussed above. The calibration of some of these reforms, as well as interactions with other reforms, are discussed in further detail in Section 5. Comprehensive QIS studies of new proposals, as well as the aggregate reforms, are necessary to understand the full implications of the reforms.

In addition to any inherent trade-off between safety and cost of Basel reforms discussed above, the complex web of rules published by Basel and other governing institutions has introduced the risk of unexpected interactions and implementation challenges of these rules.

Figure 1.2 illustrates the interconnectivity of proposed and finalized rules (partial list) on the broad financial system, including rules both inside and outside the scope of this paper. This graph is illustrative, and does not include all connections and all potential conflicts between regulations.

FIGURE 1.2 COMPLEX WEB OF REGULATIONS



Source: Oliver Wyman analysis

³⁴ Deutsche Bank to Svein Andresen, General Secretary of the Financial Stability Board (2015)

The scope and extent of the post-crisis changes in banking regulation opens the door for potential calibration and implementation challenges, along with some unintended consequences, the details of which will be discussed in Section 6.

These errors may be particularly likely given that there are multiple layers of regulation, the impact analysis of which has frequently been reviewed in isolation. This is further complicated by the interactions of Basel reforms with a number of jurisdictional regulations, as listed on pages 8-9.

The findings of this paper fall into the following areas:

An analysis of the quantitative impacts of the Basel rules on credit pricing and availability, market liquidity and other important variables. Since the literature shows a wide range of estimates for these effects, the analysis examines the key differences in assumptions that lead to such different results, giving the reader a greater ability to judge the likelihood that one approach is more accurate than another.

A review of qualitative considerations and other practical difficulties raised in regard to various Basel rules. Experts have raised concerns about the practicality of a number of aspects of various rules (e.g. deposit incentives created by the leverage ratio), some of which are listed in brief in this paper.

An analysis of competing incentives in key areas of Basel rules, such as the objective of certain rules to encourage less risky lending versus the incentives created by other rules (such as the leverage ratio and floors on risk weights) that encourage relatively riskier lending. These competing incentives can be illustrated quantitatively in many cases, although overall impact analysis is difficult.

Other concerns about calibration and unintended consequences. There are areas where knowledgeable observers have raised concerns about the calibration of effects on various market segments, but where it is difficult to do a full quantitative impact analysis. For example, some regulatory concerns are addressed by multiple reforms, leading to the possibility of overly punitive impacts for certain products, but where it is too difficult to quantify the overall impact of these disparate efforts.

These issues will be discussed in the context of Basel rules since the financial crisis and TLAC. Please refer to Appendix A for a brief summary of rules included in this study. This report does not include a detailed analysis of specific jurisdictional implementations of Basel reforms or bank structure regulation.

ADDITIONAL JURISDICTIONAL REFORM IMPACTING BANKS

In addition to the Basel and FSB reforms implemented since the crisis, banks are responsible for complying with a number of jurisdiction-specific reforms. The list below is a non-exhaustive summary of key regulations and potential for overlaps with Basel reform.

UNITED STATES REGULATION

CATEGORY	REGULATORY TOPIC	PRIMARY ORIGINS	DESCRIPTION
ENHANCED PRUDENTIAL STANDARDS		Dodd-Frank Wall Street Reform and Consumer Protection Act ("DFA")	- Various rules for US banks and foreign banks operating in the US - In particular, mandatory creation of an Intermediate Holding Company (IHC) to own all US subsidiaries; IHC subject to Federal Reserve regulation - Possible interactions with GSIB requirements
CAPITAL	CCAR and DFAST	DFA	- Annual stress testing requirements, with mid-year "light" version - Could serve as a "binding constraint" for banks (vs. CET1 or LR)
RECOVERY AND RESOLUTION PLANS (RRPS)		DFA	- Requirement for "living wills" (i.e. recovery and resolution plans) - Potential for overlap with TLAC and stress testing requirements
MARKET REFORM	Volcker Rule	DFA	US ban on prop trading and hedge fund/private equity investments for deposit taking institutions
	OTC derivatives reform	DFA, BCBS	- Shift towards Swap Execution Facilities (SEF)/Organized Trading Facilities (OTF), mandatory central clearing, increase in pre-trade and post-trade transparency - Potential for overlap with derivatives and securitization regulations
	Securitization risk retention	DFA	- Risk retention requirements for securitization issuers/originators - Potential for overlap with derivatives and securitization regulations
BUSINESS PRACTICES	Compensation/Governance	DFA	Prohibition of compensation schemes that encourage inappropriate risk taking
	Heightened expectations	DFA	Heightened expectations for Board oversight, personnel management and risk appetite
CONSUMER PROTECTION	Consumer Financial Protection Bureau	DFA	New, independent branch of the Federal Reserve created to develop and enforce consumer protection rules
	Mortgage reform	DFA	Customer protection rules against non-sustainable lending

ADDITIONAL JURISDICTIONAL REFORM IMPACTING BANKS

EUROPEAN REGULATION

CATEGORY	REGULATORY TOPIC	PRIMARY ORIGINS	DESCRIPTION
CAPITAL, LIQUIDITY AND LEVERAGE	ECB Single Supervisory Mechanism and stress testing	ECB, Bank of England (BoE), EBA	- ECB became lead supervisor of largest Eurozone banks in Nov 2014 - Stress testing requirements by multiple agencies (Bank of England, EBA) - Could serve as a “binding constraint” for banks (vs. CET1 or LR)
	RRP/SINGLE RESOLUTION MECHANISM	BoE, BRRD	- Recovery and resolution requirements from Bank of England, EU Single Resolution Mechanism (annual RRP requirement) - Potential for overlap with TLAC and stress testing requirements
MARKET REFORM	OTC derivatives reform	EMIR, MiFID II	- Central clearing of standardized Over the Counter (OTC) derivatives, reporting requirements & post trade risk management - Mandatory trading on multilateral platforms - Infrastructure access and neutrality, mandated trading platforms - Potential for overlap with derivatives and securitization regulations
	Ring-fencing	ICB, Vickers, Liikanen	- Mandatory ring-fencing of retail business, with independent funding, capital and operations - Liikanen proposals to ring-fence trading book - Potential for interaction with liquidity reforms
BUSINESS PRACTICES	Compensation	CRD IV BoE consultation	- Compensation reforms: bonus caps, payout mechanisms, clawbacks; EC challenges on variable allowances - Personal accountability of executives
	Conduct	FCA conduct agenda Fair & Effective Markets	- Continuing implementation of Financial Conduct Authority (FCA) principles-based regulation - Evolving FCA expectations on pre-sale/sale/post-sale practices
CONSUMER PROTECTION		MiFID II MiFIR	- Broad drive toward improved investor protection and controls mechanism - Precise definitions for some areas of conduct - Pre and post trade transparency (wide a range of topics covered by MiFID II, including definitions of products, liquidity, etc.)

As stated previously, the list of regulations discussed above is non-exhaustive. Banks face a number of additional regulations such as tax regulations, disclosure requirements, etc.

Jurisdictional implementation is out of scope of this report, and as such will not be discussed in significant detail.

2. HOW CAN REGULATORY IMPACTS BE MEASURED?

Analysts have used a number of approaches to measure the impact of financial regulations on the financial industry and the wider economy. In evaluating these, it is useful to step back and review the role of the financial system in society and consider the potential benefits and costs, in broad terms, of recent regulatory reforms undertaken by the Basel Committee.

2.1. ROLE OF THE FINANCIAL SYSTEM IN SOCIETY

The financial system principally plays the following important roles within the economy:

Credit allocation: acting as the primary source of credit for consumers and businesses that do not have direct access to capital markets, Banks also facilitate efficient allocation of capital by monitoring borrowers.

Financial market functions: operating and supporting debt, equity, foreign exchange, commodity, and other financial markets. This includes activities as market makers, where dealers use their own capital to support trading activities by their customers; as underwriters of new issuances of debt or equity; and the provision of other services, such as clearing transactions.

Maturity transformation: transforming short-term deposit funding into long-term loans, by providing savers with the ability to make deposits that are safe and can be withdrawn on short notice and using the aggregate stability of these deposits to fund the medium and long-term projects that drive economic growth. Similarly, banks provide liquidity insurance to households and businesses through lines of credit.

Payment services: enabling the efficient flow of money across the economy, principally between buyers and sellers of products and services.

Pooling of savings: accepting funds from numerous households and businesses to maximize their returns and minimize risk by achieving efficient scale of operation.

Risk mitigation: providing insurance, futures, swaps, options, and other products that allow households and businesses to hedge their risks.

Advice and other services: providing financial advice, including strategic advice to businesses, and a myriad of other finance-related services.

Although it is difficult to quantify the total contribution of financial institutions to economic growth, it is clear that finance has a major effect on the wider economy. Efficient and effective lending and capital markets are important drivers of investment, economic growth and financial stability. The global equities and fixed income markets are powerful sources of wealth creation, capital formation, and economic growth. However, the strength of these markets is dependent on the ease with which investors can buy or sell securities. Financial models and the degree to which banks provide each of the aforementioned services differ by jurisdiction. For example, European corporates rely more on bank lending for financing than their American peers (this, and additional differences, will be discussed in Sections 1 and 1). As such, impacts of the same regulatory reforms or other drivers of change for the financial markets will differ across jurisdictions. Regardless of jurisdictional differences, the ability of financial institutions to provide these services is clearly critical.

Problems in the financial sector, including financial crises, demonstrate this importance most clearly. The economy suffers harshly when finance is unable to play its proper role. Banks play a critical role in maintaining well-functioning markets and depend on efficient funding to provide these services.

The post-crisis regulatory initiatives are mainly aimed at increasing the resilience of financial institutions and markets to shocks such that they can continue to function effectively during stress periods. However, while endeavoring to reduce the frequency and damage from financial crises, regulation must also avoid excessively hampering the critical functions of financial institutions. In particular, the impact of regulatory reforms should not, to an undue degree, impact the ability of banks to provide credit and thus potentially stifle economic growth. Additionally, market structure and market efficiency should not experience material collateral damage and market liquidity and stability should not be harmed by excessive restrictions on financial institutions in their roles as market makers. Financial stability and financial functionality need to be appropriately balanced in all cases to avoid what George Osborne, the UK's Chancellor of the Exchequer, has referred to as the "financial stability of the graveyard,"³⁵ while also avoiding the excessive fragility that was so damaging in the recent crisis.

2.2. BROAD AREAS OF POTENTIAL IMPACTS

The Basel reforms primarily impact two broad areas: traditional lending markets and capital markets, both of which are the focus of this study. There may be impacts on other services, e.g. advisory services, but these are outside of the scope of this study. The analytical literature evaluates the impacts on the lending and capital markets by considering a number of potential or actual responses by banks to strengthened regulatory requirements.³⁶

Absorbing costs by lowering returns to shareholders. Most of the Basel reforms increase funding or other costs for banks. In the long run, financial institutions could only absorb any incremental costs of regulation if the returns to shareholders remain at or above the minimum required by investors. Otherwise, the sector will shrink as shareholders withdraw their capital, unless there are offsetting factors that make shareholders accept a lower return. While shrinkage of the sector may be a desirable outcome to some, it is certain that it would also produce adverse consequences for the economy. It is important to note that some argue that the Modigliani-Miller theorem shows that there are no costs to the banks from higher capital (see box on page 13 for more details). In reality, as explained below, we believe it is clear that the theorem only partially applies, leaving significant costs to be dealt with by the banks.

³⁵ Parker and Masters (2011)

³⁶ The bank responses to strengthened requirements are adopted from Elliott, Salloy, and Santos (2012). Some of the responses were also discussed in IIF (2011), ECB (2015), AFME and PwC (2014c), Kashyap, Stein, and Hanson (2010), Hancock and Wilcox (1994), Nier and Zicchino (2005), Gambacorta and Mistrulli (2004), Berrospide and Edge (2010), and De-Ramon et al (2012).

MODIGLIANI-MILLER (M-M) THEOREM

In their seminal paper, Modigliani and Miller (1958) show that, under idealized conditions, it does not matter what proportion of a firm's funding comes from equity rather than debt, that is, a firm's cost of funding is invariant to the mix of funding. Adding more equity makes a firm less risky and reduces the cost of each unit of equity or debt by an amount that exactly offsets the switch to an otherwise more expensive mix of funding. This fundamental theory of finance is the core reason some theorists and their followers argue that there is no economic cost to forcing banks to fund themselves much more through common equity.

However, the real world differs from the idealized conditions under which the M-M theorem holds in various significant ways. This has implications for bank capital requirements, which increase the share of equity on a bank's balance sheet.

Tax advantages for debt. Modigliani and Miller ignored corporate taxes in their initial work. In reality, interest payments on debt and deposits are tax deductible in most countries, while dividends to shareholders are not, creating a major incentive for banks and other firms to fund with debt. Thus, an increase in common equity capital requirement would increase bank funding costs and some or all of this cost would be passed on to borrowers absent some offsetting factor.

Deposit guarantees and other backstops. Bank deposits are guaranteed up to certain limits, and some argue that government policies provide protection to uninsured deposits and bank debt through implicit guarantees. Guarantees of debt and deposits block the key mechanism of Modigliani-Miller, since there is little reason for funders with guarantees to lower what they charge as banks become safer. A perfect risk-based pricing system for guarantees would offset the behavioral effect, but we do not have this in practice and are unlikely to achieve it, for both political and technical reasons.

Issuance costs. Modigliani-Miller does not take transactional costs of raising funding into account. There are two key reasons why these costs are higher for equities. First, the direct issuance costs for equity are significantly higher than for debt or deposits. Second, investors tend to insist on a significant price discount if a bank wants to sell them stock, as there is a possibility that the management wants to sell stock for a particular reason (e.g. expecting the price to decline). As such, it may make sense for banks to build equity slowly over time by retaining all profits and avoiding dividend distribution (though cutting dividends is difficult in practice due to its signaling effect) and share buybacks, thus eliminating the problem of issuance costs but creating potential for market distortion as some banks build equity faster than others.

Investor reactions. The theorem relies on investors to lower their return requirements proportionally with the reduction in risk implied by the increase in equity. In fact, many studies have cast doubt on the extent to which this actually occurs in the market, creating a whole literature, and even investment category, around the "low risk anomaly." (Baker and Wurgler demonstrate this specifically for banks, as well as referencing the wider literature.) In addition, for now, the market appears to have some skepticism as to exactly how much adding equity truly increases bank safety. As such, investors may not drop their required return as much as Modigliani-Miller assumes as banks raise more equity. This will create pressure for banks to avoid operating with significantly higher equity levels.

Shadow banking. The higher costs that would be imposed on banks because of these "real world" issues would create strong market pressure to move business out of the highly regulated banking system into various forms of shadow banking. Dodd-Frank has given US regulators some powers to deal with shadow banking, but nothing like the authority that would be needed to counteract a high level of market pressure. A financial system that relied primarily on shadow banking entities, which are less regulated and typically have lower capital levels, would be more vulnerable to crises that would shake the wider economy.

Transition issues. Given the still-fragile global economy, there are a number of transition issues that may prevent Modigliani-Miller from holding under idealized conditions.

Source: Modigliani and Miller (1958), and Elliott (2013b) for the violations of the M-M theorem in real world.

Raising prices. In credit markets, financial institutions could choose to pass through any increases in funding costs to borrowers in the form of increased interest rates. The rate of this pass-through is a fundamental assumption in studies measuring the impact of regulation on the economy. Additionally, the increased funding costs may be passed on to a different degree to the lending rates of risky borrowers, compared with the lending rates of less risky borrowers. Similarly, in capital markets, financial institutions could increase bid-ask spreads and transaction fees to pass on regulatory costs to other market participants. This is one of the main transmission channels through which the change in capital and liquidity regulations impacts the wider economy.³⁷

Reducing expenses. In responding to higher costs, banks could attempt to cut their expenses to maintain their margins. Banks have communicated their expense reduction programs, while acknowledging the increased compliance and transition and transformation costs are linked to the implementation of new regulations (e.g. prudential, markets, conduct, and financial crime). In particular, administrative and marketing expenses could be targeted for reduction. In addition to the benefits of reducing their expense ratios, more efficient banks could also gain market share, lowering the overall industry's average expense ratio.

Decreasing expected credit losses. In order to reduce the probability and size of potential losses, financial institutions can try altering lending terms and conditions without reducing their loan volumes or increasing their prices. For example, banks could include tougher covenants at loan origination to reduce the expected losses.

Reducing the regulatory impact through technical means. There is scope for banks to moderate the impact of regulatory reforms by taking certain actions designed to meet the particular requirements posed by regulations. For example, a bank could improve its data collection and management, as well as modeling efforts, thereby enabling the firm to utilize a lower risk weighting under the internal modeling approach. Additionally, banks will respond to regulatory changes by looking for the optimal structure through which to offer a given product while maintaining compliance with applicable rules.

Rationing credit. Financial institutions could also choose to make fewer loans by rejecting those loan applications that fail to meet newly heightened credit standards. This could be done at the individual loan level or by making a decision to withdraw from lines of business that do not meet minimum profitability criteria.

Restructuring their businesses. Financial institutions may choose to exit certain lines of business, change the structure of their enterprises, or shrink the size of particular business lines to meet required minimum ratios. A bank may choose to utilize a combination of strategies discussed above in addition to changing their portfolio of business lines to optimize the overall profitability of the organization.³⁸

2.3. IMPORTANCE OF COST/BENEFIT ANALYSIS

The concept of balancing the trade-off between safety and economic efficiency is critical, as core Basel reforms will have implications for financial institutions and the overall economy, both positive (benefits) and negative (costs).³⁹ Allocation of risks should be assessed separately, as concentration of risks within banks can be seen as negative, while the diffusion of risks (e.g. execution risk, basis risk) to the wider economy can be seen as positive or negative (if the end users or investors are no longer able to hedge a risk that they do not want to bear).

³⁷ BCBS (2012)

³⁸ Elliott, Salloy, and Santos (2012), IIF (2011), AFME and PwC (2014c)

³⁹ BCBS (2016h)

There is very little empirical research yet available on the realized impact of the Basel reforms, leaving the policy community to rely on best estimates based on quantitative models of what the impact is likely to be.

The literature suggests that higher capital and liquidity standards improve the resilience to shocks of individual banks and the financial system as a whole. Improved resilience, in turn, reduces the likelihood of a financial crisis and the size of the economic loss if the crisis does occur. Thus, the primary benefit of the capital and liquidity standards is a lower probability of a financial crisis and the associated reduction in the expected cost of such a crisis in terms of lost output.

However, the literature also highlights that higher capital and liquidity requirements pose significant costs to banks, which are, in turn, passed on to the rest of society. Capital requirements impact bank funding costs which can drive banks to reduce lending volumes and increase price of credit for both households and non-financial firms. Changes to liquidity requirements reduce interbank lending and maturity transformation, which also impact the lending channel and aggregate borrowing. Additionally, *bank* liquidity requirements may reduce overall *market* liquidity.⁴⁰

Bank capital and liquidity regulations must strike a balance between costs and benefits, as the Basel Committee itself readily acknowledges. BCBS (2012) states that higher capital and liquidity requirements may generate social benefits by reducing the frequency and severity of banking crises and the accompanying loss of economic output, and may generate costs by impacting the price and availability of credit and other financial services, and thereby altering the level of investment and output in the economy.⁴¹

To comprehensively quantify the tradeoffs between costs and benefits of reforms, sophisticated modeling of the financial system and its place in the economy as a whole is required. Any such model has to make important assumptions about whether some of the loss of economic growth from a financial crisis is permanent and how quickly the transitory components return to normal. Studies differ considerably in their assumptions in this regard, with resulting wide divergences in their results. This analysis should also take account of important alterations in the business models of banks as a result of the regulations and associated changes in the competitive environment in the financial sector (including externalities), including a likely loss of market share to non-banks, such as those often referred to as “shadow banks,” which are outside of the regulated sphere. However, these effects are not considered in most such models.

2.4. POTENTIAL BENEFITS FROM ENHANCED REGULATION

As discussed above, there are multiple benefits of capital and liquidity regulations. Capital regulations have received a great deal of analysis over the years and there is broad agreement that they bring benefits (as well as costs). However, due to the relatively recent introduction of liquidity requirements, there have been a limited number of academic studies assessing their benefits. Though there is some variability in opinions regarding the degree of regulation required, as well as the implementation of these regulations, there is still a general consensus in the industry that appropriate liquidity regulations have social benefits.

The most significant benefit of both capital and liquidity regulation is the decrease in the probability of a systemic financial crisis and the decrease in expected cost of such a crisis. Specifically, capital requirements incentivize banks to increase the quality and quantity of capital, thereby making banks less vulnerable to shocks and downturns. Reforms also help moderate the effects of potential “runs” on banks and prevent the need for a fire sale of assets at low prices due to the need to raise capital. Additionally, by helping reduce the likelihood of a crisis, capital and liquidity reforms also help avoid a decline in government revenues that typically follows a banking crisis.

⁴⁰ BCBS (2016h), GFMA, IIF and PwC (2015)

⁴¹ BCBS (2012)

If a severe crisis does occur, capital and liquidity requirements insulate taxpayers and the overall society from having to bear banks' unexpected losses by providing an ample supply of both capital and liquidity.⁴²

Within periods of less severe downturn, a higher capital level enables banks to continue lending. Similarly, liquidity buffers and reserves are expected to insulate banks' balance sheets from any shocks in short-term funding as well as to inhibit banks' ability to take on excessive maturity transformation risk, which can be a major source of bank failure. By insulating balance sheets from liquidity shocks, regulations limit the impact on aggregate output in stressed periods by also reducing the contraction in bank credit supply, and lower the probability of systemic crises by decreasing the degree of interconnectedness in the financial system. Thus, capital and liquidity regulations help smooth out the lending cycle, making the provision of credit more stable, and help preserve long-term relationships between banks and their customers.⁴³

Finally, increased capital requirements have an impact on behavioral incentives and reduce moral hazard in several ways. First, increased requirements may incentivize banks to invest in less risky assets (although there are some concerns that the leverage ratio incentives counteract this). Second, capital strengthening provides an incentive for the bank to reduce its probability of default by monitoring the borrowers to whom the loans were issued, further preventing likelihood of high losses (this incentive, much discussed in the literature, is less important when discussing increases in capital requirements above levels that already ensure the stockholders have real "skin in the game"). Third, capital requirements may mitigate the incentives to develop risky and complex products, assuming that risks are measured well for the capital test and that the complexity of regulations does not itself promote complexity.⁴⁴

2.5. POTENTIAL COSTS FROM NEW REGULATIONS

Regulatory reforms also impose costs on financial institutions and the economy. First and foremost, reforms impose additional costs for banks through an increase in total funding costs, which may then be passed to the wider economy through two key mechanisms.

Price of credit. Within the lending channel, banks are likely to pass some or all of their increased funding costs to their consumers by increasing the lending rates, and fees for banking products. Pricing may impact some market segments more than others, creating an uneven distribution of these costs. Banks may raise the prices of riskier loans, such as corporate loans, more than the prices of less risky household loans, in order to adjust their risk-weighted assets more efficiently. Or, there may be the opposite effect if the leverage ratio, which is risk-insensitive, becomes the binding capital constraint. These impacts, in turn are carried through to the rest of the economy.⁴⁵

Supply of credit. Higher capital and liquidity requirements may also impact the supply of credit; first, through tightening of credit standards, which may also differ by market segment. Second, higher capital requirements tie up more of a bank's capital, reducing its ability to utilize that capital to generate loans without raising more capital.⁴⁶

Second, reforms impose additional costs by forcing banks to use long-term funding for transactions that are well-funded and short-term in nature. These changes may impose relatively high costs on short duration trades (especially derivatives) without improving liquidity management, and may potentially have a substantial impact on the provision of products to investors, businesses, and the economy.

⁴² Reinhart and Rogoff (2009a), ECB (2015), BCBS (2016h), Gobat, Yanase, and Maloney (2014)

⁴³ ECB (2015), BCBS (2016h)

⁴⁴ ECB (2015), BCBS (2016h), De-Ramon et al (2012), Nguyen (2014), Berger and Bouwman (2013)

⁴⁵ De-Ramon et al (2012), Elliott, Salloy, and Santos (2012)

⁴⁶ Nier and Zicchino (2005), Gambacorta and Mistrulli (2004), Berrospide and Edge (2010), Van den Heuvel (2002)

Transaction costs. The incremental cost of funding formerly short-term funded transactions long-term will challenge the economics of many trades. The higher costs of long-term funding will be passed on to clients and capacity is likely to be withdrawn in many markets where the economics no longer work.

Price volatility. In segments of the market where the economics are no longer attractive, banks will reduce capacity, adversely impacting market liquidity for end users and limiting market access. Execution risk has been partially transferred to the end-users. Market liquidity will, in turn, impact the frequency and magnitude of price movements.

Bond prices. As a result of a decline in liquidity, investors often demand a higher liquidity risk premium as compensation for investing in less liquid securities. Increases in liquidity risk premiums drive up the overall required rate of interest for bonds, which causes existing bonds prices to fall.

Availability and pricing of hedging instruments. Some OTC long term derivatives are no longer offered or have been repriced as a result of higher capital requirements, uncertainty with regard to future treatment thereof (including the capacity of the relevant trading desk to pass the qualifying test under the new market risk framework), and differences in cost to each bank. As a result, end users may choose to bear an additional basis risk or alternatively may be forced to bear an additional basis risk.

Reduction in net interest margin (NIM). Banks may experience a reduction in their NIM⁴⁷ as a result of liquidity requirements. On the income side, the tilt towards holding a larger inventory of HQLA can result in a reduction in interest income as these assets typically have lower yields commensurate with the lower level of risk of these assets. On the expense side, the regulatory requirements of holding more stable funding sources on the balance sheet can result in higher interest expenses as these funding sources are typically more costly.⁴⁸ Reduced profitability across the industry in the long run could even result in systemic instability of the banking sector.⁴⁹

Interbank lending. Introduction of the LCR may result in less interbank lending in normal times, as banks strive to maintain their own liquidity reserves.⁵⁰

Lastly, reforms impose additional operational costs such as costs of having to run both modeled and standardized calculations in parallel, and average leverage calculations for reporting, implementation of FRTB requirements, and costs related to ring fencing.

Overall, the thrust of regulatory reforms is to impose relatively higher costs upon the largest and most complex banks, especially those that operate globally (G-SIBs). The structure of banking and capital markets is being reshaped through a combination of regulatory reforms and market forces, which will continue to drive change for years to come. However, the impacts of the change of collective behavior of financial institutions and the change in the structure of banking and capital markets on the functioning of the financial sector has not been fully assessed and may result in unintended consequences.

⁴⁷ Net interest income minus net interest expense

⁴⁸ BCBS (2016h)

⁴⁹ Tsomocos (2001)

⁵⁰ BCBS (2016h)

Furthermore, it will take a much longer time period to fully assess the cost of these changes to the wider economy. Some industry stakeholders and officials argue that we have not seen sufficient academic rigor in studying how all the post-crisis regulatory reforms work or impact markets. The scale of change has led to calls for regulators to take stock of the cumulative effects of these changes and to assess what unintended consequences may mean for a further round of regulatory changes (especially on the recalibration efforts of some of the reforms) to set things right. Now is the time for the industry, academia, and policymakers to engage in the detailed academic and practical work to increase efficiencies and identify where unintended consequences arise.⁵¹

OFFSETS TO ECONOMIC COSTS

In calculating the net costs to society of the Basel reforms, analysts must also make a decision about the potential for offsetting policy actions, in particular, the potential for central banks to reduce overall interest rates in the economy in order to offset increases in borrowing costs due to higher lending spreads or less liquid and more expensive financial markets. Under most conditions, central banks do have the capability to move overall interest rate levels downwards through rate setting, as well as open market operations, to offset higher effective borrowing costs, should they choose to do so. Most studies do not attempt to quantify this impact, due to its subjective nature.

In addition, there are at least two major disadvantages or constraints on such moves by central banks. First, this is much less effective at the “zero lower bound”. As we have seen in much of the developed world in recent years, monetary policy is more difficult and complicated and generally less effective when rates are very low or negative. Second, there are potentially large distributional consequences of attempting to offset higher spreads on borrowing by reductions in the base interest rate. Unless central banks wish to directly allocate credit by targeting specific asset classes to buy, they are largely confined to moving overall interest rates. However, regulations tend to affect certain types of loans or financial markets considerably more than others, as discussed below.

Additionally, other bank reactions discussed in Section 2.2 may also serve as offsets (e.g. banks reducing expenses).

DISTRIBUTIONAL CONSEQUENCES

As discussed earlier, impacts of Basel reforms are likely to be unequally distributed to end users. Within the lending channel, product and customer segments will be impacted differently. While the majority of studies focus on aggregate impacts, a subset of studies is able to identify distributional consequences. In particular, authors such as Mendicino et al (2015), de-Ramon et al (2012), and ECB (2015) note that corporate loan rates are more affected by Basel reforms.⁵² Additionally, similar impacts are expected for loan volumes: Mendicino et al (2015) and Meeks (2014) note that corporate loan volumes are impacted more than mortgage loan volumes. The asymmetric impact on corporate and mortgage loan rates and volumes imply a larger impact on non-financial corporations in the Eurozone, which finance close to 70% of their total debt through bank lending compared to US non-financial corporations, which finance approximately 30% through banks.⁵³

Studies focusing on the impacts of reforms on capital markets also provide insight into the impact of reforms on different asset classes. For example, GFMA, IIF and PwC (2015) show that the extent of reduction in trading assets held by banks has been most significant for credit and commodities since these asset classes have incurred the greatest change in risk weighted assets in recent years. The IMF, in its semi-annual Global Financial Stability Report⁵⁴, has noted that the liquidity trends of investment grade and high yield corporate bonds in the US have diverged, with investment grade bonds recovering significantly more rapidly post crisis. Examination of market effects necessarily uses historical data, but comprehensive analysis of the potential future policies and likely bank reactions to them is required to capture potential systematic risk.

⁵¹ Ludwig (2016), Anderson (2016)

⁵² Mendicino et al (2015), ECB (2015), de-Ramon et al (2012)

⁵³ Galles and Vallas (2014)

⁵⁴ IMF (2015b)

2.6. ATTRIBUTION ISSUES

Quantifying the costs and benefits of the Basel reforms poses multiple challenges. Various approaches and methodologies have been used in the literature to assess the effects of the reforms, each with their own strengths and limitations. Across all methodologies, assumptions play a critical role in quantifying the full impact of regulations. A subset of these assumptions deals with attribution issues of reform. Four key issues are described below.

First, a key consideration in any quantitative study of the impact of regulatory changes is the baseline against which to compare. In conducting an empirical evaluation of the impact of reforms, one has multiple choices about what time period or what level of capital ratios to use as a baseline. One may choose to use the regulatory minimum of Basel II capital requirements as the baseline, but that would fail to capture the reality of most financial institutions.

Financial institutions determine their individual minimum target capital and liquidity levels based on factors above and beyond the regulatory requirements for several reasons. First, banks' own risk models estimate the economic capital that these institutions require to minimize the likelihood of adverse outcomes such as bankruptcy or being in the position to be prevented from distributing variable pay or dividends. Second, rating agencies frequently expect that financial institutions maintain certain levels of capital and liquidity in order to maintain the credit rating level targeted by the institution. Third, counterparties, financial markets, and shareholders may expect and demand levels above the regulatory minimum. This is particularly true as a result of the crisis, which drove up market expectations of appropriate safety margins of capital and liquidity. Finally, the banks may choose to maintain additional buffers to lower the risk of regulatory intervention should things go wrong. Thus, using the pre-crisis regulatory minimum as the baseline may overestimate the impact of reforms, as market forces would have forced bank capital and liquidity ratios to have increased as a response to the financial crisis independently of new regulatory requirements.⁵⁵ In the new environment, regulatory requirements are generally substantially greater than those generated by banks' internal models or rating agency models or pressure from funders. Thus, only the last reason, the maintenance of buffers to reduce the risk of regulatory intervention, continues to be a significant factor.

Second, it is difficult to isolate the impact of regulatory reforms from the market response. As noted, counterparties and financial markets have reacted to the lessons of the crisis and demanded greater capital and liquidity from banks, independent of regulations. However, it could be argued that regulations have generally gone well beyond what markets would demand today.

Third, it is challenging to attribute observed impacts solely to a specific regulation, be it Basel reforms, other regulations or government interventions.⁵⁶ For one, multiple government interventions and supervisory actions have had a significant impact on the capital adequacy of banks. In Europe, supervisory stress tests at both the regional and individual national level (e.g. EBA's EU-wide capital exercise in 2012 and the ECB's Comprehensive Assessment (CA) exercise in 2014) have also helped drive an increase in capital and liquidity ratios. Additionally, there were also cases of government interventions and supervisory actions that took place prior to banks' beginning to approach the minimum required level of capital: these interventions took place to support the banks' credit activity or to restore confidence in financial markets. Financial institutions in the US have seen a similar wave of stress testing and supervisory activities above and beyond Basel standards. US regulators often exercised supervisory judgment, driving banks to adjust capital and liquidity levels for additional safety and soundness in the financial system.⁵⁷

⁵⁵ Elliott, Salloy, and Santos (2012)

⁵⁶ Elliott, Salloy, and Santos (2012), ECB (2015)

⁵⁷ ECB (2015)

Fourth, the unusual economic and monetary policy conditions since the crisis have strongly influenced banks' behavior and results in ways which are unlikely to be good indicators of the long-term impact of reforms. For example, the very high levels of liquidity provided by central banks to the economy may be offsetting underlying changes in market liquidity driven by Basel reforms. Similarly, very low, and even negative, interest rates have a variety of effects on banks that make it hard to determine the direct effects of regulatory changes.

2.7. QUALITATIVE CONSIDERATIONS

There are a number of qualitative considerations that should be taken into account when assessing the impact of regulatory reforms. These include:

SHADOW BANKING

Regulatory reforms will undoubtedly increase costs for traditional financial institutions subject to the Basel rules. For example, Basel III increases the required tangible equity capital for banking activities multiple times in the US compared to requirements prior to reforms. Most non-banking financial institutions will not have to face the higher capital requirements, putting them at a competitive advantage for the activities in which they compete with banks. As such, these non-banks could act as "shadow banks," by providing similar services to end users at a lower cost. For example, some credit activity may move to capital markets. Further, there is a strong natural demand for maturity transformation services that are expected to become significantly more expensive for traditional banks to fulfill due to the new liquidity rules, which will likely push banks to increase the maturity of their liabilities and reduce the term of their assets. This demand may be met by other non-banks.⁵⁸

To date, the influence of shadow banks is not clear and has not been sufficiently studied. There are clearly potential benefits from a shift in market share to non-banks. However, a shift towards shadow banking may increase systemic risk as these institutions lack access to central bank deposits for short-term liquidity, may not provide deposit guarantee schemes to investors, and provide volatile funding which can result in greater volatility in the economy.⁵⁹ The full impact of shadow banks will depend on the scope and quantity of traditional banking activities carried out by these institutions, as well as the extent to which their activities appropriately consider risks. It is clear, however, that these institutions will not be bound by the same regulations that traditional financial institutions are subject to, and the risks of the typical banking activities carried out by them may not be mitigated to the same degree. Thus, regulatory reforms may result in the reallocation and not the mitigation of certain systemic risks, as a portion of risks is shifted to the less regulated areas of the shadow banking sector.

IMPACT ON BANK INTERNAL PRICING MECHANISMS

Limited empirical study has been conducted on the impact of regulatory reforms on internal transfer pricing and capital allocation mechanisms within a financial institution. However, these mechanisms have a significant impact on business strategy and risk management decisions that impact bank operations. Due to the significance of their effects on internal decision-making, these mechanisms are likely to have an impact on the end users. As such, the impact on bank internal pricing mechanisms is covered in further detail in Section 2.

IMPACT ON EMERGING MARKETS

Research to date has focused primarily on developed markets, leaving the discussion of impacts on emerging markets as primarily a qualitative consideration. In general, many analysts expect less of a direct impact, since the greater risk of operating in emerging markets has usually caused banks in those countries to have substantially higher capital levels than those required by the Basel Committee. Thus, the already existing higher levels of capital allow emerging market banks to more easily meet the new Basel rules without adding capital.

⁵⁸ BCBS (2016h), Elliott, Salloy, and Santos (2012), Kashyap, Stein, and Hanson (2010)

⁵⁹ Monaghan (2014), Luttrell, Rosenblum, and Thies (2012), Ordóñez (2015)

However, there are unintended effects of regulation that may spill over into emerging markets through both domestic and cross border activities of global banks, such as movement of capital in and out of countries in response to regulation. These markets are often faced with financial crises, and frequently experience spill-over effects from the developed markets. Thus, there are expected benefits of Basel reforms for these markets through prevention of financial crises. Additionally, increases in capital requirements under current consolidation and risk management practices may disproportionately impact operations of subsidiaries of global banks in emerging nations, particularly those where foreign banks have a large market share. This could lead to an underestimation of the size of the costs for emerging countries.⁶⁰ The Basel objective of simplification may also conflict with an appropriate treatment of emerging market exposures, the lack of granularity leading to cliff effect or the frequent absence of external rating of corporates potentially leading to penal treatment.

PRODUCT AND GEOGRAPHIC INCENTIVES

Regulatory reforms create incentives that make some products and jurisdictions more attractive than others. As discussed above, one example of this could be the relative attractiveness of developed and emerging markets. Operations of subsidiaries in emerging markets could be more impacted than those in developed markets, making emerging markets less attractive.⁶¹

⁶⁰ Elliott, Salloy, and Santos (2012), BCBS (2016h), Reinhart and Rogoff (2009b)

⁶¹ BCBS (2016h), GFMA, IIF and PwC (2015)

3. IMPORTANCE OF INTERNAL ALLOCATION AND PRICING MECHANISMS AT FINANCIAL INSTITUTIONS

3.1. CAPITAL AND LIQUIDITY ALLOCATION AND PRICING WITHIN FINANCIAL INSTITUTIONS

Accurate analysis of the impact of financial reforms on end users requires an understanding of how financial institutions make internal allocation and pricing decisions about capital, liquidity, and other scarce resources, as these have a direct effect on the supply and price of the services they offer. The aggregate effect of the decision processes of these intermediaries determines the provision of credit and other services to the wider economy. Therefore it is critical to understand these allocation decision processes as policymakers set capital, liquidity, and other regulations. Good cost-benefit analyses, for example, depend on an accurate reading of the actions banks and other financial institutions will take in response to new regulations.

Academics and some policymakers frequently treat banks and large securities dealers as if they were unitary institutions, whereas a more accurate view is that they are internal markets of considerable dimensions, with many different units, often of substantial size, competing for the bank's scarce capital, liquidity, and other resources (for simplicity, this section will generally refer to "capital" allocation, since this is the most important aspect of a larger financial resource management process that also includes, at a minimum, allocation of liquidity, usually via funds transfer pricing and limits.)

Large and complex financial institutions use internal pricing to allocate resources to lines of business commensurate with their long-term risk-adjusted returns. Within lines of business, capital is usually allocated to the opportunities and client relationships with the highest returns, taking account of capital usage, liquidity effects, and other factors. In addition, absolute limits on usage of capital or liquidity are sometimes set for individual units. The evolution of RWA is closely monitored by investors, including their granular evolutionary split between business growth, regulatory changes, and management actions. Returns on RWA or returns on equity targets are also communicated to investors and the public for the primary business lines of banks (typically for the global banking and capital markets activities). The execution of the strategy and communication to analysts and investors requires a strict, permanent, and granular management, including on these key metrics, by all businesses and units of a bank. Whatever the mechanisms for allocation of capital and liquidity, business units and, even individuals, are judged on the returns they generate for the amount of capital that they use. Those that have more profitable opportunities will push for more capital to be allocated to them and those with less profitable opportunities will want to reduce their capital allocation so as to reduce their profit hurdles.

The allocation process is easiest to describe for lending, but operates in a similar manner for all products that need a significant amount of capital. All sophisticated banks use some version of a core loan pricing formula which requires a loan to be priced to at least cover: expected credit losses, administrative costs, non-capital funding costs, and the cost of the capital allocated to the transaction. Going forward, there is also likely to be an explicit credit or charge for any effect on the bank's liquidity position from the transaction.

The key question then becomes how that quantity of capital is determined. This has become much more complicated, because there are now a number of capital calculations that could be used, all of which are relevant. The capital requirements can broadly be classified as those driven by internal, rating agency, and regulatory expectations, all of which must be managed simultaneously within the capital planning process. Further regulatory requirements now break down into multiple potentially binding regulatory constraints:

- Based on risk weighted calculations (standard or advanced)
- Based on a leverage ratio
- Based on stress tests (with variations based on end of test period criteria)

In practice, regulatory requirements are effectively replacing internal and rating agency criteria as the drivers of internal pricing and allocation mechanisms. The reason for this is simple; regulations are now virtually always considerably more onerous than the other methodologies in terms of the capital they require. This reflects a considered decision by policymakers globally that the economic externalities of financial crises require that banks maintain more capital and liquidity for society's benefit than they would choose to for internal reasons or as a result of demands from their shareholders and funders. As economic and regulatory capital diverge further due to decreases in the risk sensitivity of regulatory capital under the ongoing workstreams, the changes in business incentives and models are going to be more significant.

The internal allocation mechanisms of banks, as described here, are designed to achieve the optimal usage of the scarce resources of capital and liquidity. This is even clearer for banks that are balance sheet constrained. Since regulatory requirements now exceed the requirements from other approaches, banks are inevitably reworking their allocation procedures to use regulatory capital and liquidity as the constraints. This runs counter to the desire of many policymakers that banks continue to use internally generated pricing and allocation mechanisms based on their own view of the risk inherent in different activities. This is ultimately a vain hope when the true limit on what activities can be undertaken overall is actually determined by regulatory capital and liquidity requirements.

Thus, in practice, regulatory choices about capital and liquidity rules and in particular, the risk-sensitivity or lack thereof, will affect choices about the pricing and availability of credit and other services in quite specific ways throughout the organization, as individual units and entire organizations determine whether the business they have traditionally done can still provide a reasonable return on capital under the new, more binding constraints. Policymakers have made clear that they do not wish to dictate business models, except to eliminate a few that they deem particularly dangerous, but the practical effects of various regulations and their interactions do, in fact, substantially influence business models for the future. Some are concerned that a "monoculture" is developing as banks (especially large ones) are all being pushed into the same type of business model. This would increase risk because there would be little diversity among the peer banks that can assist in normal times or a stress period via purchase of a troubled bank or by providing deep markets for the sale of assets or to absorb activities that the troubled bank can no longer conduct.

3.2. INTERNAL ALLOCATION APPROACHES

Binding constraint allocation. Some banks base the quantity of capital for their loan pricing formula on whichever of these constraints is most binding at the moment. This is generally also what academic theory implicitly or explicitly assumes. Taken to the extreme, as it usually is in academic models for the sake of simplicity, this would tend to produce a "corner solution." That is, the bank would make decisions on the basis of the currently most binding constraint until and unless the effect of those decisions, or external circumstances, causes another constraint to become binding.

This is a reasonable mode of operation for a bank, as long as one constraint is currently binding and is likely to remain the binding constraint for long periods. However, some banks find themselves in a situation where the binding constraint will sometimes be a stress test, sometimes the risk-weighted approach, and sometimes the leverage ratio. This raises real problems of a practical nature, which are particularly well illustrated by the conflicting incentives given by the leverage ratio and the risk-weighted approach.

The risk-weighted approach is specifically designed to impose higher capital requirements for higher risk loans and lower requirements for lower risk loans. Therefore, when this is the binding constraint, a bank tends to charge more for higher risk loans than it would have based solely on expected credit losses and other economic characteristics and to charge less for loans with lower risk weights. This may also reduce the volume of higher risk loans that are made, unless the market will fully bear the higher required pricing.

In contrast, the leverage ratio is intended to treat all assets the same, with no regard for risk levels. Therefore, when the leverage ratio is binding, the required capital level is constant across all types of loans, making higher risk loans more attractive, since they generally allow banks to charge a higher spread over the expected losses and other costs. Low risk loans and activities can become difficult to sustain, unless all competitors and substitute products are similarly bound by the leverage ratio, since the capital charge can be higher than the entire spread that would have been charged if economic factors alone were taken into account. In particular, once a firm is meeting the aggregate threshold, there is clearly a marginal cost to do more activity. At this point, firms must either abstain from doing additional business or raise equity, in which case the cost of capital becomes a serious constraint.

Thus, a bank which uses only the currently binding constraint in its pricing formula could find itself favoring low-risk loans if the risk weighted approach is binding and therefore be moving its average risk weight downwards over time, until it meets the point at which the leverage ratio became the binding constraint. At that point, the formula would start to seriously penalize low risk loans compared to high risk ones. Loan officers could find themselves bouncing back and forth between certain types of loans one day and the opposite types of loans the next day, switching back and forth as often as the formula is reset. Behaviorally, this is not an approach that will work for any bank. From a branding perspective, the bank marketers and other employees need to maintain a reasonably consistent strategy for long periods at a time in order to be effective in the marketplace.

Blended average allocation. Another approach is to use a blended average of the capital required by the most important constraints. For example, a bank might require a loan to be priced with an assumed capital level equal to 40% of that calculated using risk weights plus 40% of that calculated based on the leverage ratio plus 40% of that estimated from a reverse engineering of the stress tests. This makes it less likely for the bank to find itself at a corner solution, although it also creates a somewhat higher average capital level than if it tried harder to optimize capital usage. Note that the total weights must add to more than 100%, otherwise the formula would lead to a lower required capital than the single binding constraint, since it would be a weighting of the most binding constraint with other requirements that are lower. Further, even if all the relevant constraints were initially at the same level, it would not provide a buffer against shifting requirements unless it added to more than 100%.

The effects of using a blended average approach will depend heavily on the weighting chosen by the bank. Decisions will look more like those taken under the leverage constraint if that is given a high weight or like those under the risk-weighted approach if that has a high weighting in the pricing formula. The only certainty is that average capital levels will be higher than those held when only the most binding constraint is considered, unless the simple approach is augmented by an ad hoc additional buffer to achieve a similar goal.

In the real world, competitive factors affect these decisions. This can strongly constrain how capital requirements feed through into actual pricing. Banks are generally willing to accept lower than targeted returns on certain products or businesses if they believe that the situation is temporary and if the relation with the client or counterparty is well monitored. Competition for many banking products is strong enough that there is a real limit to how far banks can increase their pricing without facing a sharp drop-off in volume. There are significant costs to shifting in and out of product lines, so bankers are generally loath to effectively pull out of a product line while waiting for conditions to adjust. That is not to say that banks never select this option. For example, to reduce leverage amid investor pressures to increase profitability, some market participants have planned to cut their long-dated derivatives business lines even in light of transition costs and loss of revenue. The opposite choice, of staying in while doing a much lower volume of business, faces the problem that there are likely to be significant costs that are effectively fixed for as long as the bank stays in that product line. Thus, operating leverage works against too sharp a drop in business volumes unless a decision to abandon the line has been made. In practice, all of this means that individual decision-makers, and the credit committees and other higher bodies that constrain them, override the pricing formulas from time to time, sometimes to a very significant extent. Senior management wants there to be an alignment of the pricing formulas and the business decisions, so any period of divergence will be followed by changes in the pricing models or mandated changes in actual behavior, depending on the ultimate view of the

reasons for the gap between theory and reality. Additionally, in some jurisdictions there may be further pressure from regulators to ensure that pricing tools are adequately calibrated.

3.3. POTENTIAL REGULATORY IMPACTS

Ideally, it would be possible to observe how banks are actually setting their pricing and allocation policies and to see what effects that has on customers and therefore the wider economy. However, banks and large securities dealers are still in the early stages of evolution of their financial resource management processes, with some firms more advanced than others. Why are they not further along, given the importance described above?

First, managers are still waiting to a significant degree for the regulators to put their pens down and reveal the final version of key regulations and for some clarity on how those regulations will be implemented in practice. Therefore, they have been making moves only on the basis of the major, clear trends, such as the increasing importance of leverage ratios. We have seen some large changes in business models, such as the announced shift of Morgan Stanley, UBS, and other banks towards asset management and away from securities operations as a result of these factors.

Second, there is not a consensus among analysts or within firms as to the right approach to the difficult analytical issues described above. This has led to hesitancy in changing existing approaches and has also spurred different firms to move in somewhat different directions. Some retain their capital allocation approaches based on risk weights, while others have adopted a weighted average of multiple constraints as their approach. The overall impact of rules such as the leverage ratio are directionally the same across banks, but how this plays through into decisions can differ.

Third, there may be wider latitude than normal being exercised in regard to actual pricing as compared to the results of pricing formulas. It has become clear that there are likely to be quite significant price shifts across lending and capital markets products, due to sharp changes in regulatory requirements and market conditions. But, clients are not yet willing to accept the full magnitude of the changes. In the UK, lenders reported that “widening funding spreads had led to increases in their transfer prices — the internal prices charged to business units within each bank to fund the flow of new loans. But there has been little evidence so far of this rise being passed through into the interest rates charged on new lending.”⁶² Since many competing banks are hoping to be among the last standing in particular products, and therefore counting on others to fall away, clients are continuing to find banks that are willing to move their pricing only modestly in order to retain customers while waiting for other banks to withdraw. In other words, there is a kind of “repeat game” being played out, in which the leaders in a given product may introduce higher pricing, or ration the availability of currently underpriced capacity, but they can only move modestly. They then need to sit back and watch the reactions of customers and competitors to determine whether they can, and should, take the next step towards the ultimately required pricing.

3.4. HIGH-LEVEL DISCUSSION OF POST-CRISIS CHANGES IN ALLOCATION AND PRICING MECHANISMS

Senior bank executives have the ability to substantially affect capital allocation decisions across the firm by setting the capital calculation in the pricing formula. Since there are a wide variety of methods they could use for this calculation, the effect of capital regulation on the real economy will be significantly affected by what the different banks choose to do. The results are likely to be substantially different than assumed in simple academic models that lead to corner solutions.

Different banks are likely to choose different approaches to setting their capital requirements in their pricing formulas. The variations will depend on many factors: different views of the underlying analytical questions, which are far from settled, different underlying business models and customer bases, and varying internal political

⁶² Bank of England’s Bank Liabilities Survey conducted in 2015 Q3, as quoted in Bank of England (2015b)

dynamics, among other factors. This variation in approaches may create a more diversified range of business models, reducing the risk of a systemic problem if a particular business model runs into problems.

Some banks will choose to use an approach that blends multiple regulatory constraints, reducing the risk that any one of them triggers extreme actions. For example, a straight leverage ratio as the binding constraint is feared to push banks to pull out of low risk areas and to push into higher risk loans. On the other side, there are fears that the zero risk weight for many sovereign bonds causes excessive concentration in this area, encouraged even further by new liquidity requirements. If both constraints are applicable simultaneously in the internal capital markets, there is less chance of incentives driving excessive concentrations in either direction.

However, a blended approach means that the leverage ratio has become partially binding immediately for a large number of the banks that use this approach. This exacerbates a serious concern among many analysts that the leverage ratio is too simplistic and that taken on its own, it does not fully capture a bank's risk position. These analysts argue that it should not normally be the binding limit and that it is better suited to being a backstop that becomes binding in unusual cases. There is, of course, a minority of analysts who would prefer to see the leverage ratio be the most binding constraint, in which case they will see this as a positive development.

There may be disorder in the financial system as different banks alter their business models solely based on their choice of approach to dealing with the analytical difficulties of these multiple potentially binding capital constraints. There could be short-term volatility of pricing and availability of credit and customers could find themselves having to build new banking relationships for no underlying economic reason, if the differences in capital allocation are sufficient on their own to significantly alter business models.

Another implication can be viewed as either positive or negative. The existence of multiple potentially binding capital constraints creates a bias in favor of universal banks that may be able to offset constraints in one area with headroom in others. Securities firms on their own are likely to find the leverage ratio their binding constraint, with plenty of room to increase their average risk weights, while traditional lenders would be in the opposite situation in most cases. Operating in the same banking group might allow them to benefit from diversification by allowing one unit to "borrow" spare capacity from the other in regard to an otherwise binding constraint in a way that could not be done outside the group. This depends, of course, on whether the rules of the given jurisdiction impose the same constraints on each unit as on the group as a whole, in which case the group might theoretically have more room, but not be able to take advantage of it within any unit. Sometimes the constraints imposed by geographical or business separation as a result of local rules (e.g. the implementation of the Vickers report in the UK), as a result of the resolution strategy, the banking group's structure, or internal business decisions will sharply limit any such flexibility.

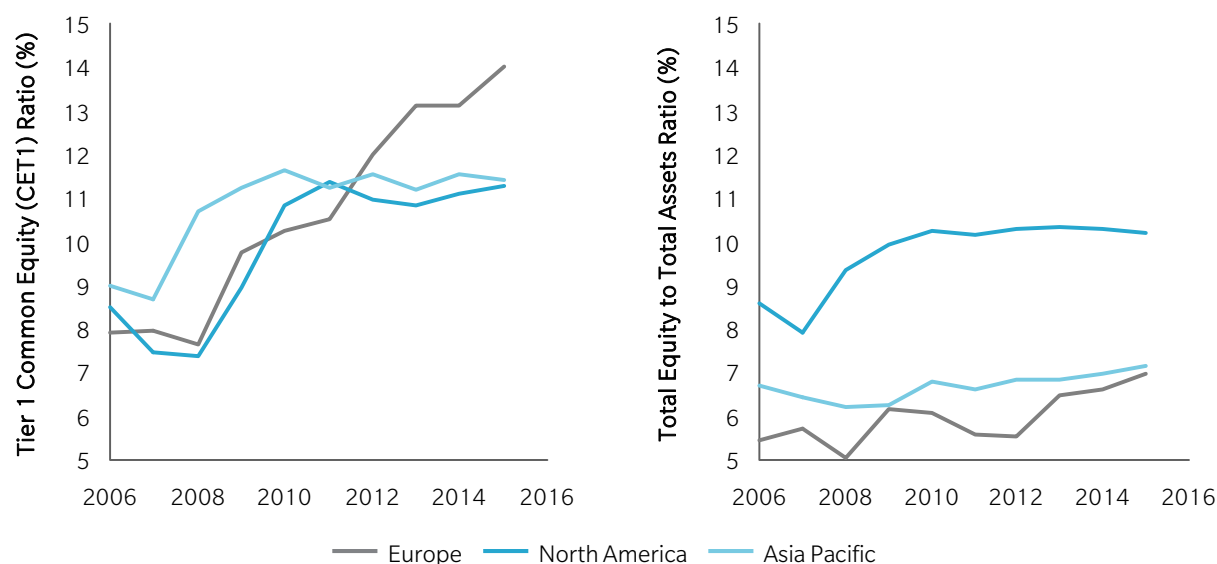
In sum, the issue of internal capital markets within banks and other credit intermediaries is a crucial one that needs more study. The formulae used to guide these internal markets will be critical to the real world impact of the changes to capital and liquidity regulations. Some conclusions are already clear, as discussed elsewhere in this report, while others are still developing.

4. IMPACT ON THE LENDING CHANNEL

The primary focus of this section is to discuss the findings of studies by academics, officials, and other industry observers on the *overall* impact of Basel reforms on the lending channel, supplemented with additional analysis where market data is available.

Post-crisis Basel reforms significantly affect the lending channel, primarily by increasing the quantity and quality of capital required and creating new quantitative liquidity requirements. Prior to discussing the impacts of reforms on banks and end users, it is important to understand how banks have responded to new regulatory requirements – particularly minimum capital requirements. The figure below illustrates the actual capital ratios from 2006 to 2015 for the top 50 banks in Europe, North America and Asia Pacific, measured in the then-current regulatory accounting standards, which understates the increase in capital in the most recent years, since Basel III's stricter definitions for Tier 1 Common Equity and Risk-Weighted Assets came into force. For example, according to the comparison between initial 2010 Basel I/II common equity tier 1 capital ratios and Pro forma Basel III common equity Tier 1 capital ratios (after RWA increase and capital deductions) as calculated by Elliott, Salloy, and Santos (2012) the difference between the two measures was 2.6% for Europe and Japan, and 3% for the US, which points to the magnitude of change between Basel II and Basel III ratios.

FIGURE 4.1: BANK CET1 RATIO AND TOTAL EQUITY TO TOTAL ASSETS RATIO, 2006–2015⁶³



Source: SNL

As illustrated above, the banking system is considerably better capitalized than it was before the crisis. This figure aggregates the impacts across all banks within the respective regions, and thus CET1 trends could be more pronounced for some market participants. For example, European banks have raised their ratio of CET1 to RWA substantially higher, due, at least in part, to pressure from the leverage ratio requirements, which are more strongly binding on many European banks given their low average risk weights. As the figure above indicates, North American total equity to total asset ratios exceed those of their European peers.

⁶³ Tier 1 common capital (Common Equity Tier 1) ratio as defined by the latest regulatory and supervisory guidelines. For US institutions during Basel III, this will be transitional when applicable, and the lesser of the standardized and advanced approaches. For non-US institutions, this may be transitional or fully loaded, depending on availability. Includes top 50 banks in each geography.

While aggregation makes trends for particular market segments less pronounced, the ratios above indicate a pattern of growth in bank capital, driven at least in part by Basel reforms. These reforms will increase banks' total cost of funding, despite the fact that Modigliani-Miller theorem shows that an increase in capital ratio should have no impact on the cost of funding, under idealized conditions, as the unit costs of debt and equity decline due to lower insolvency risk to exactly offset the change in the proportion of (expensive) equity and (cheap) debt. In Section 1, we discuss violations of the theorem's underlying assumptions in the real world and provide an overview of the limitations of the theorem.

Tougher capital requirements. Most of the Basel reforms focus on raising the level of required capital and shifting more of it into tangible common equity and away from debt and preferred equity instruments. The minimum capital levels rise in part from direct increases in required ratios and in part because most risk weights are higher in Basel III than in Basel II. The latter effect will be increased by proposed limitations on the use of models and proposed floors on the model-based capital levels. Beyond this, the new leverage ratio requirement may force some banks to have more capital than is needed under the risk-weighted approach.

New liquidity requirements. The LCR and NSFR push banks towards balance sheets with longer maturity liabilities and shorter-term, safer, and more liquid assets than they might otherwise keep. This translates to more expensive funding and/or lower returns on assets, and potentially, at least, transitory limits on the amount of lending and other activities that can be undertaken until asset and liability changes can be completed.

Interactions of capital and liquidity requirements. While the higher capital and new liquidity requirements both increase funding costs, the total impact is generally lower than the sum of the two individual effects. The two types of requirements each indirectly move banks to take actions which assist in meeting the other requirement. Equity is effectively treated as the most stable form of liability, so higher equity capital levels reduce the need to increase other stable sources of funding. On the other side, assets that count as HQLA are generally lower risk, as well as more liquid, and therefore carry lower risk weights, reducing risk-weighted capital requirements.

Total loss absorbing capacity requirement. TLAC also increases funding costs by requiring large banks to hold additional long-term debt, which could be converted to equity, or written off, in the event a bank hits severe problems.

There are two key impacts of post-crisis Basel reforms for the end users.

Increased price of credit. As banks move towards more equity, their total cost of funds increases. To offset these higher costs, banks will charge more for their loans, all else equal. Refer to Section 1 for a detailed discussion of transmission mechanisms.⁶⁴

Decreased supply of credit. As a result of higher capital ratios and requirements for higher quality capital, banks could increase their credit standards and reduce the amount of loans they issue, thus decreasing the amount of capital they deploy. Refer to Section 1 for a detailed discussion on transmission mechanisms.⁶⁵

⁶⁴ Elliott, Salloy, and Santos (2012), Modigliani and Miller (1958), IIF (2011), De-Ramon et al. (2012), BCBS (2012), Kashyap, Stein, and Hanson, (2010), AFME and PwC (2014c), King (2010), Kisin and Manela (2015), MAG (2010), BCBS (2010a)

⁶⁵ Elliott, Salloy, and Santos (2012), IIF (2011), Hancock and Wilcox (1994), Nier and Zicchino (2005), Gambacorta and Mistrulli (2004), Berrospide and Edge (2010), De-Ramon et al. (2012)

CHOOSING THE RELEVANT STUDIES

There are roughly twenty studies by academics, officials, and industry groups that analyzed the overall effects of the main Basel capital and liquidity reforms. The most comprehensive is the Institute of International Finance (IIF) study,⁶⁶ which showed a large effect on the overall economies of the advanced nations as a result of a very wide range of regulatory and related policy actions, including proposed new taxes on financial institutions that were under consideration at the time. We have excluded this study from our analysis because it includes far more than the Basel reforms and, by the nature of its design, does not allow the effects of different reforms to be broken out.

The next most comprehensive study is Elliott, Salloy, and Santos (2012), which projected the impact of the Basel reforms of capital and liquidity requirements, as well as changes in taxation and derivatives rules. We include this study, because it generally broke out the effects, allowing us to focus on those changes relevant to the Basel reforms. There is a modest issue with the allocation of offsetting impacts shown in the study that include more than capital and liquidity effects, but this is a relatively minor issue. It should be noted that the authors acknowledged the considerable uncertainty in their projections and provide a range of sensitivity analyses that will not be discussed here for the sake of brevity.

All of the other studies either focused only on capital (in the majority of cases) or on both capital and liquidity, and most broke out the effects between them. Capital has been the prime focus both because it is better understood and because it was generally assumed to have the greater effect.

The quantitative studies conducted by the Basel committee and by the industry also provide valuable information on the expected impact of rules. The findings of these studies are shown in figures indicating estimated increases to funding rates.

All of the studies of overall impacts on lending that are included here were conducted without consideration of the many workstreams that some industry observers lump together as “Basel IV”, such as the Fundamental Review of the Trading Book and revisions to the standardized approach for operational risk, unless explicitly stated.

ACHIEVING COMPARABILITY ACROSS THE ANALYSES

In this section, we use the existing comprehensive analyses to estimate the cumulative impact on lending of the core Basel III capital and, where possible, liquidity reforms. To do this, a number of assumptions have to be made, since many of the studies estimated the impact of a single point change in capital requirements, rather than the cumulative impact. Fortunately, the studies all use approaches that explicitly or implicitly assume that additional funding costs from higher capital levels are linear, so that it is reasonable to simply multiply the estimate by the number of points by which capital requirements are raised.

However, this leaves the question of how large an increase in capital requirements results from the Basel reforms. As discussed in Section 1, there are multiple choices one could make about a baseline. We have chosen to use the approach from Elliott, Salloy, and Santos (2012), with updated figures. That is, we assume that capital levels as of the end of 2010 reflected market forces and that further increases in capital since then have been driven by Basel reforms.⁶⁷ Return to the pre-crisis capital levels would not be acceptable to the markets and the bank themselves even without any change in regulation. December 2010 provided enough time for banks and market forces to adjust to the lessons of the financial crisis and to move capital levels to their new target levels. At the same time, it was sufficiently in advance of the implementation of Basel III that the prospect of the new and still somewhat undefined capital rules would not have been the main factor in determining capital levels. There are clearly potential objections to this choice of baseline, but we believe it provides a reasonable starting point for analysis.

⁶⁶ IIF (2011)

⁶⁷ Elliott, Salloy, and Santos (2012)

Since the funding cost effects of capital are roughly linear (an assumption of this report and all, or virtually all, of the literature), readers can adjust up or down if they view the baseline as inappropriate.

The change from this baseline is calculated by assuming that banks will target an average ratio of CET1 of 12%. This target is 2 percentage points higher than in Elliott, Salloy, and Santos (2012) as a result of further Basel actions and a better estimate of targeted voluntary buffers above regulatory minimums, based on several additional years of experience.

4.1. LOAN RATES

As previously discussed, the Modigliani and Miller theorem does not generally hold to the full extent in the real world and banks therefore face higher costs due to higher capital requirements. Studies have shown that the theorem does not hold in full at all times, and in reality higher equity levels do increase a bank's costs. Thus, by increasing the amount of equity at banks, capital requirements increase banks' funding costs (liquidity requirements add costs in a similar manner). This increase in the cost of funding may be passed on to the end users in the form of higher loan rates.⁶⁸

We focus on the *cumulative* impact of these reforms to aid comparability and because the aggregate effects are important to judging the calibration of the rules. In terms of comparability, some studies estimate the impact of a one percentage point increase in the capital ratio while others estimate the impact of the total increase in capital. The following intermediary steps are needed to derive the cumulative impact:

First, the increase in the total capital ratio due to regulatory changes will need to be calculated. However, this is not as straightforward as it sounds as the calculation will need to factor in the change in the definition of capital (i.e. one dollar of capital pre-crisis is not the same as one dollar of capital post-crisis) and factor out the increase in capital required by market forces (i.e. banks would have to maintain more capital post-crisis even if the regulatory requirements stayed constant). To address the former, we use the pro forma Basel III capital for all periods. The average pro forma 2010 baseline Basel III CET1 levels were 6.7% for the US, 7.1% for Europe, and 6.6% for Japan. These calculations are taken from Elliott, Salloy, and Santos (2012).

Next, we assume that, at a minimum, average capital ratios will increase to 12% in all regions by the end of 2019 as a result of regulatory reforms: reflecting requirements of 4.5% common tier 1 capital, 2.5% capital conservation buffer, a 2% G-SIB surcharge, and a 3% buffer to account for additional tier 1 buffers held by banks. This assumption has been tested against recent average CET1 ratios for the top 50 banks in Europe and North America, which are reported to be 13–14% and ~11% for 2014–2015, respectively. While this assumption may not hold for all banks, we assume this to be a representative target that banks will have to reach by 2019.⁶⁹

For studies that evaluate the impact of equity-to-RWA increases, we multiply the estimated loan rate increases per one point of risk-weighted capital ratio by the difference between the baseline and target ratios for risk-weighted assets. For example, the CET1 capital ratio in the US would need to increase by 5.3 percentage points, from 6.7 percent of RWAs in 2010 to the targeted 12%. The total impact on lending rates in the US is then calculated by multiplying the increase in lending rates per one percentage increase in lending rates by 5.3. Another required adjustment is for studies that estimated the impact for the increase in non-risk-weighted assets (i.e. total assets). For these, we first calculate the change in the non-risk-weighted capital ratios by using average risk weights (RWA/Total Assets). We assume risk weights to be constant, as an explanation and forecasting of the complex topic of average risk weights depends on a number of factors outside of the Basel reforms and as such lies outside the scope of this report.

⁶⁸ Elliott, Salloy, and Santos (2012), Modigliani and Miller (1958), IIF (2011), De-Ramon et al. (2012), BCBS (2012), Kashyap Stein and Hanson (2010), AFME and PwC (2014c), King (2010), Kisin and Manela (2015), MAG (2010), BCBS (2010a)

⁶⁹ BCBS (2011b), BIS (2016e), SNL

We calculate the gaps to target as described in the figure below.⁷⁰

TABLE 4.1: TARGET CAPITAL RATIO AND CALCULATION OF THE GAP FROM BASELINE

	BASELINE (OBSERVED)			TARGET (ASSUMED)			GAP	
	End-2010 pro forma Basel III CET1 ratio	Capital-to- (non-risk- weighted) total assets ratio	Average risk weighting	Target Basel III CET1 ratio	Capital-to- total assets ratio, without risk weighting	Average risk weighting	Basel III CET1 ratio	Capital-to- (non-risk- weighted) total assets ratio
US	6.7	5.4	0.8	12	9.6	0.8	5.3	4.3
Europe	7.1	3.1	0.4	12	5.2	0.4	4.9	2.1
Japan	6.6	3.0	0.4	12	5.4	0.4	5.4	2.4

As shown in the table above, the differential cost of meeting higher capital standards varied by region. Since European and Japanese banks have an average risk weight of approximately half of the level of the US (~40% versus ~80%), banks in these nations will need to raise less capital per dollar of total assets in order to meet an increase in the ratio of capital to RWAs.⁷¹ The differences in average risk weighting are driven by a number of jurisdictional and bank-specific factors.⁷²

Applying the gaps calculated above to the 1% increase in capital requirements estimated by academic and official studies allows us to compare the gross impact of reforms on lending rates. We do not adjust the projected impacts of increased liquidity requirements, because we have too little information to do so and cannot assume linearity.

Additionally, some studies include an estimation of offsetting factors that reduce the impact of reforms on banks. The discussion of these offsetting factors will follow the discussion of gross impacts.

IMPACT ON GROSS LENDING RATES

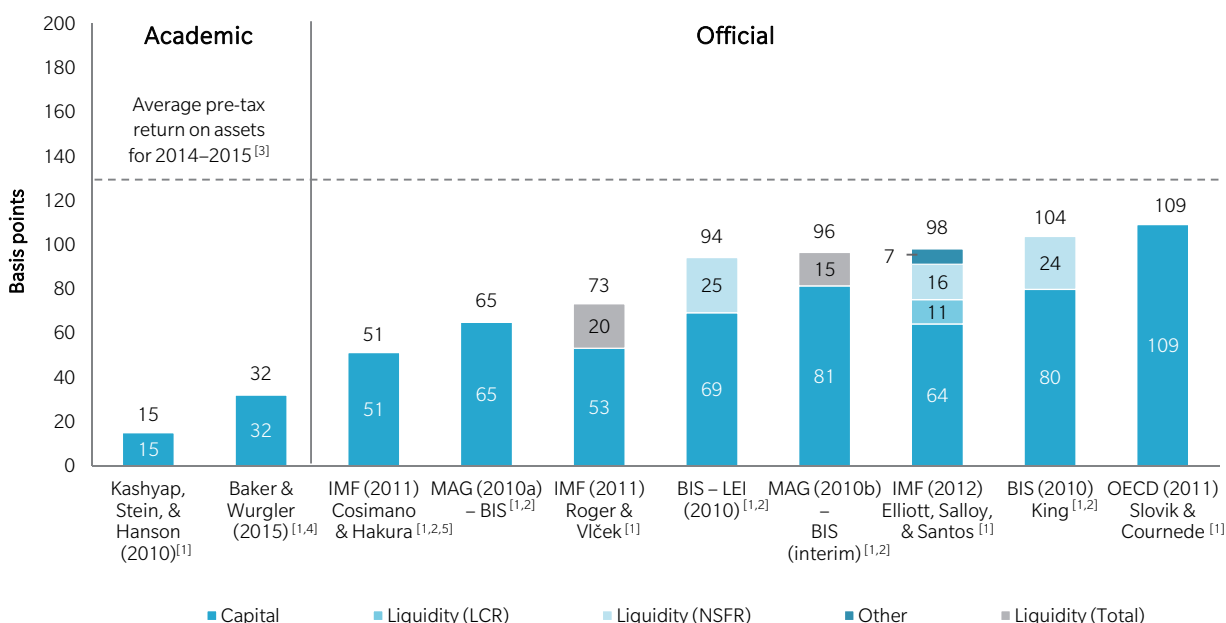
The graphs below summarize the impact of reforms on funding costs (and therefore potentially loan rates) in the US, Europe, and Japan, as reported by a number of academic and official studies. Some studies shown below include multiple jurisdictions in their data sample. In these situations, the cumulative impact is scaled by the appropriate factor for each jurisdiction.

⁷⁰ Elliott, Salloy, and Santos (2012)

⁷¹ Ibid

⁷² According to IIF (2016), national factors (e.g. local laws, taxation, accounting standards, national 'gold-plating', local market tendencies), and inherent differences between banks (e.g. client characteristic, portfolio composition, and recovery strategies) contribute to 75% to the RWA variability. An additional 25% of RWA variability is driven by modeling choices. Additionally, supervisory interpretation may play a role in RWA variation.

FIGURE 4.2: GROSS IMPACT OF BASEL REFORMS ON FUNDING COSTS IN US



[1] Average impact per 1 percentage point increase in capital is multiplied to account for total projected increase in ratios since 2010

[2] Includes US, Europe, Japan

[3] Average of 2014–2015 return as (total net income before taxes)/(total assets) for all banks; Source: SNL, Oliver Wyman analysis

[4] Estimate of impact on lending spreads (basis points) of increasing ratio of capital to assets by one percentage point is taken from BCBS (2016) “Literature review on integration of regulatory capital and liquidity instruments”

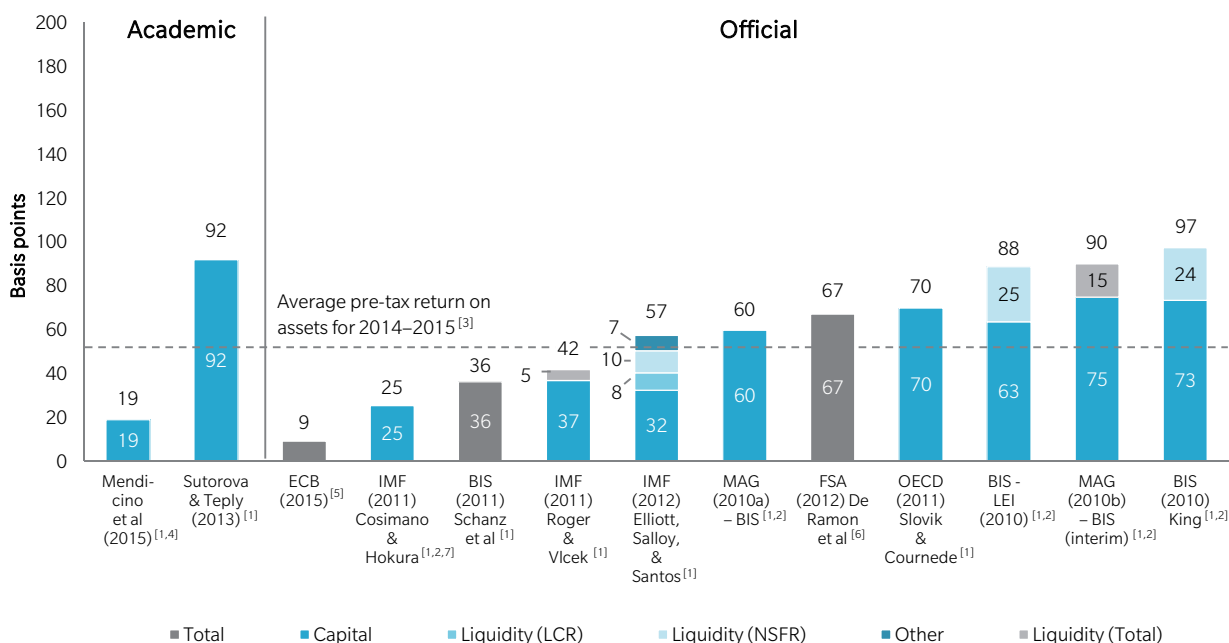
[5] Based on increase in the loan rate for the 100 largest banks

The gross impact of Basel reforms on funding costs in the US ranges from 15–109 basis points in these studies, using our baseline and target capital ratios. The impact is largely driven by an increase in capital requirements. The median impact of increased regulatory requirements is 84 basis points and the mean is 74 basis points. This potential impact is highly significant compared to the average pre-tax return on assets, which averaged a little over 120 basis points in 2014 and 2015 and was lower historically (~1% for 1937–2015).⁷³

We note that academic studies tend to estimate lower impacts on the markets than official studies, though the differences in results are mainly driven by differences in assumptions and factors such as the scope of research and consideration of offsetting factors and methodological details. A discussion of these factors follows and the individual studies are presented in further detail in the appendix.

⁷³ SNL and Foran, Moszkowski, Elliott (2016)

FIGURE 4.3: GROSS IMPACT OF BASEL REFORMS ON FUNDING COSTS IN EUROPE



[1] Average impact per 1 percentage point increase in capital is multiplied to account for total projected increase in ratios since 2010

[2] Includes US, Europe, Japan

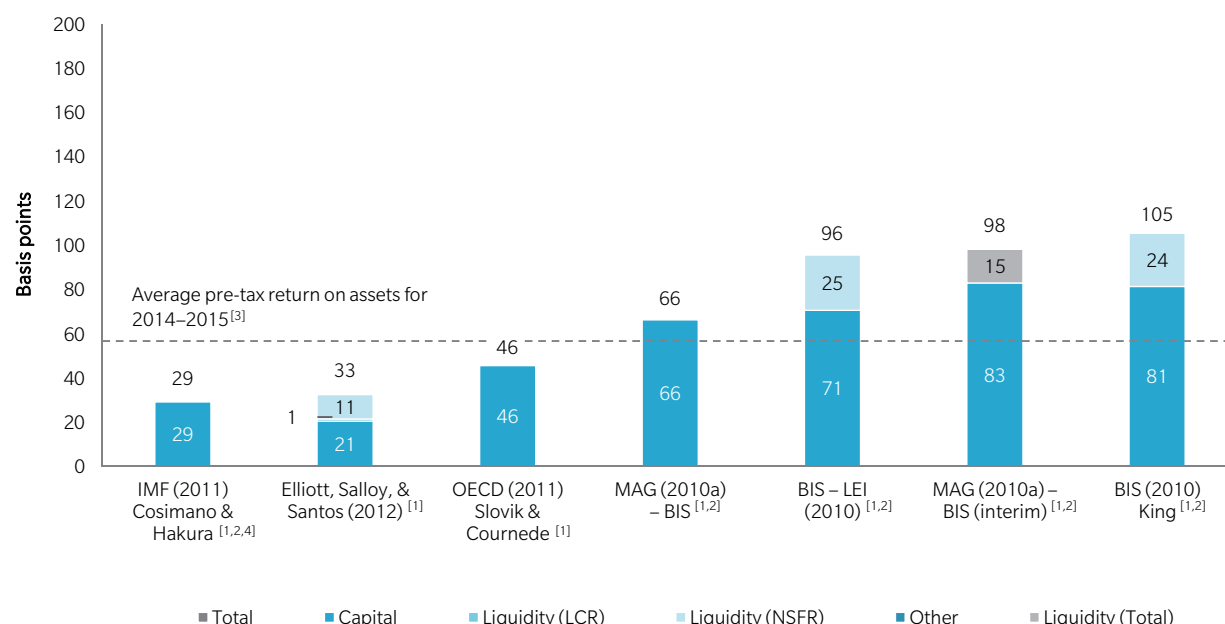
[3] Average of 2014–2015 return as (total net income before taxes)/(total assets) for all banks; Source: SNL, Oliver Wyman analysis

[4] Estimate of impact on lending spreads (basis points) of increasing ratio of capital to assets by one percentage point is taken from BCBS (2016) "Literature review on integration of regulatory capital and liquidity instruments"

[5] Based on increase in the loan rate for the 100 largest banks

The impact on Europe ranges from 9–97 basis points, with a median impact of 60 basis points and mean impact of 58 basis points. The magnitude is significant when compared with the average pre-tax return on assets, which has averaged a little over 50 basis points in the last 2 years. Again, the majority of the effects are driven by an increase in capital requirements.

FIGURE 4.4: GROSS IMPACT OF BASEL REFORMS ON FUNDING COSTS IN JAPAN



[1] Average impact per 1 percentage point increase in capital is multiplied to account for total projected increase in ratios since 2010

[2] Includes US, Europe, Japan

[3] Average of 2014–2015 return as (total net income before taxes)/(total assets); Source: SNL, Oliver Wyman analysis

[4] Based on increase in the loan rate for the 100 largest banks

The gross impact of Basel reforms on funding costs in Japan is expected to range from 29–105 basis points in these studies, using our baseline and target capital ratios. The impact is largely driven by an increase in capital requirements. The median impact of the increased regulatory requirements is 66 basis points and the mean impact 68 basis points. This potential impact is significant compared to the average pre-tax return on assets, which averaged a little over 50 basis points in 2014 and 2015.

Additionally, Gambacorta and Shin (2016) find that a 1% increase in the ratio of equity to total assets leads to a 3 basis point increase in the cost of funding. The estimate is smaller than other estimates discussed above as the study calculates a significant reduction in the cost of debt resulting in approximately a 50% Modigliani-Miller offset, not taking account of the tax benefit of debt (which would lower the offset) or the reduction in required return on equity, (which would raise the offset.)⁷⁴

As observed above, the sheer magnitude of impacts differs regionally: our analysis of the literature shows that estimates of the gross impact of the new Basel capital and liquidity requirements on funding costs in the US ranges from 15–109 bps, with a median increase of 84 bps. The impact in Europe ranges from 9–97 bps, with a median increase of 60 bps. The estimated increase in funding costs in Japan ranges from 29–105 bps with a median increase of 66 bps. This is primarily driven by the fact that US banks have to close a larger gap to our chosen target capital ratio, which may be in part an artifact of using the same target ratios for all regions and focusing on a target ratio based on RWA, which is affected by the very different average risk weights across the regions. However, using a different base for different regions introduces another layer of assumptions which the authors deemed not be worth the loss of comparability.

⁷⁴ Gambacorta and Shin (2016)

Even with the larger basis point effect on the US, the higher funding costs are likely to have a relatively larger aggregate impact in Europe and Japan, where the average pre-tax rates of return on assets are lower than in the US and the banking systems are much larger in comparison to the size of their economies.

DRIVERS OF DIFFERENCES IN ESTIMATES OF IMPACT

There are several drivers of the variation of estimates of impacts. We summarize these trends and then discuss the underlying studies in further detail in the appendix.

First, not all studies are fully comparable due to the scope of their research. Some of the studies incorporate the impact only of capital reforms, while others also include the impact of liquidity reforms.

Second, the gross impact of the reforms ignores offsetting factors that could decrease the overall impact, which will be discussed shortly. Some studies include offsets while others do not.

Third, the methodology used has an impact on the estimate. Approaches that rely on DSGE or GMM estimations (e.g. Roger and Vlcek (2011) and Cosimano and Hakura (2011)) tend to estimate lower impacts of the reforms, likely due to the fact that these approaches are able to adjust for multiple interactive effects in the economy and could include some inherent offsets.⁷⁵ However, DSGE are highly complex and require researchers to make a number of parametric assumptions and make decisions about which mechanisms that affect the dynamics of the economy should be incorporated into the model. As such these models rest on a number of assumptions that could sway the results and are difficult to compare across studies.⁷⁶ Approaches using the accounting method tend to estimate higher gross impacts, as these approaches do not usually take into account the interaction between loan pricing and market demand, and these models usually do not fully address the issue of how default risk affects the cost of funding.⁷⁷ BIS studies that rely on a number of member models tend to imply estimates that are within the middle to high range. This may be driven by the fact that these reflect an impact on the average economy, which may differ significantly from the three regions that we focus upon, which are all developed economies.

Fourth, in general, academic studies tend to show a lower impact of reforms, driven in part by the fact that they only show the effects of capital reforms. This is also driven by other methodological approaches and assumptions, which are listed above and discussed in further detail in the appendix.

Finally, it is important to note that the estimates of effects represent a lower bound on the gross impacts of the Basel reforms on loan rates, as these estimates do not include the effects of the post-2012 reforms expected to impact banks' RWA calculations (e.g. limitations on use of internal models, revisions to standardized approaches for credit and operational risk, etc.). Nor is the leverage ratio assumed to be binding in any of the studies.

Detailed discussion of these studies and underlying assumptions can be found in the appendix.

EFFECTS OF MORE RECENT AND ONGOING BASEL REFORMS

As discussed earlier, the estimates of lending impacts shown in the studies above are focused on the increase in capital ratios or liquidity requirements. Thus, due to either the study design, or the fact that many of these reforms are quite recent, the studies above do not capture the additional impacts of the more recent Basel reforms such as revisions to standardized approaches for credit and operational risk, FRTB, limitations on use of internal models, and capital floors.

⁷⁵ Roger and Vlcek (2011), Cosimano and Hakura (2011)

⁷⁶ BCBS (2016h), Sbordon et al (2010), Fernandez-Villaverde (2009)

⁷⁷ BCBS (2016h), De-Ramon et al (2012), King (2010), Slovik and Cournede (2011)

Quantifying the impact of these reforms is challenging, primarily due to the fact that not all reforms have been finalized, and calibration is not yet complete. For example, the calibration of the capital floors could range significantly and will interact with the calibration on the limitations on use of internal models. However, based on industry and analyst research it is clear that these reforms will increase bank RWAs.⁷⁸ However, it is important to note that the Group of Central Bank Governors and Heads of Supervision (GHOS) has stated that the Basel “Committee will focus on not significantly increasing overall capital requirements.”⁷⁹

As discussed above, the exact impact of the reforms is not yet clear in part due to the fact that they have not all been finalized or implemented, leading to a wide range of estimates, the majority of which point to the lower bound of RWA increase to be ~10–30%. These estimates are discussed in further detail in Section 1.⁸⁰ Banks could react to these reforms in two ways: raise their CET1 levels to offset the increase in RWAs, if they do not have sufficient CET1 already, or shrink the size of their RWAs through balance sheet reduction. In the table and figure below, we assume that banks increase their CET1 capital and show the estimated ranges of impact should RWAs increase by up to 30% as a result of these reforms. To calculate the likely impact on gross funding costs, we assume that the target capital ratio increases by 10–30% across all geographies.

TABLE 4.2: IMPACT OF BASEL REFORMS ON FUNDING COSTS

SCENARIO	MINIMUM INCREASE (BASIS POINTS)	MEDIAN INCREASE (BASIS POINTS)	MAXIMUM INCREASE (BASIS POINTS)
US			
Basel III baseline	15	84	109
Baseline and 10% extra increase in RWA	18	97	134
Baseline and 20% extra increase in RWA	22	111	158
Baseline and 30% extra increase in RWA	25	125	183
Europe			
Basel III baseline	9	60	97
Baseline and 10% extra increase in RWA	10	74	115
Baseline and 20% extra increase in RWA	11	80	137
Baseline and 30% extra increase in RWA	12	87	159
Japan			
Basel III baseline	29	66	105
Baseline and 10% extra increase in RWA	36	81	123
Baseline and 20% extra increase in RWA	42	96	141
Baseline and 30% extra increase in RWA	46	110	159

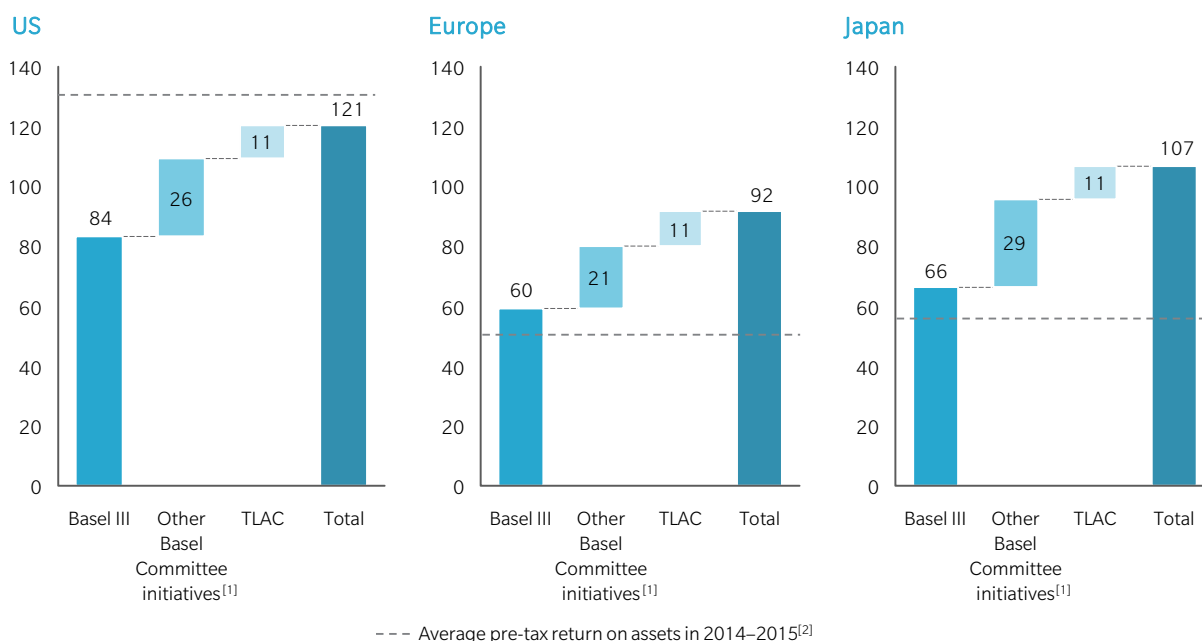
⁷⁸ Dawn (2015), Durand (2015), Keenan and Spick (2015), KPMG (2015), Macquarie Equities Research (2016), The Economist (2015), Turner (2012), Graham, Li, and Kruse (2016), IIF (2016), BCBS(2015f), ISDA, GFMA, and IIF (2015), ORX Association (2016), J. P. Morgan Cazenove (2015), Oliver Wyman and Morgan Stanley (2015), The Association of German Public Banks (2016), Risk Control (2016), McKinsey (2015)

⁷⁹ BIS (2016m)

⁸⁰ Dawn (2015), Durand (2015), Keenan and Spick (2015), KPMG (2015), Macquarie Equities Research (2016), The Economist (2015), Turner (2012), Graham, Li, and Kruse (2016), IIF (2016), BCBS(2015f), ISDA, GFMA, and IIF (2015), ORX Association (2016), J. P. Morgan Cazenove (2015), Oliver Wyman and Morgan Stanley (2015), The Association of German Public Banks (2016), Risk Control (2016), McKinsey (2015)

The figure below illustrates the components of a median increase in gross funding costs.

FIGURE 4.5: IMPACT OF ADDITIONAL BASEL REFORMS ON MEDIAN ESTIMATED INCREASE OF GROSS FUNDING COST



[1] Revisions to standardized approach to credit risk, market risk, operational risk, IRRBB, limitations on use of internal models, capital floors. Calculated as median estimate of 10% inflation scenario, 20% inflation scenario, and 30% inflation scenario
 [2] Average of 2014–2015 return as (total net income before taxes)/(total assets); Source: SNL, Oliver Wyman analysis

Figure 4.5 above demonstrates that an increase in RWA due to the most recent Basel reforms could increase funding rates even further. For the US, this implies that if bank RWAs were to increase by the projected RWA inflation ranges, the median estimate of impact on funding rates would approach the average pre-tax return on assets. For Europe and Japan, the increase in funding costs would consistently exceed the average pre-tax return on assets. Funding costs will further increase when the incremental effect of TLAC are added, as will be discussed later on.

Revisions to SA for credit risk, FRTB, the revised approach to operational risk and other Basel reforms. The biggest drivers of this increase in RWAs would be the revisions to the SA for credit risk, FRTB, the revised approach to operational risk, limitations on the use of internal models, and capital floors. In essence, the impact of these ongoing workstreams could be multiplicative (as discussed in Section 5) because these reforms will make it more expensive for banks to meet their capital requirements.

TLAC. In addition to the factors discussed above, loan rates are also likely to be impacted by TLAC requirements. In a November 2015 BIS study, an Experts Group for the FSB (2015) estimates that, depending on the calibration of TLAC, loan rates could rise between 5.4 and 15.2 basis points (reflecting increases in funding costs). Experts Group for the FSB (2015) notes that “the size of the impact on lending rates is directly linked to the relationship between the cost of eliminating the shortfall and the size of the loan book of the G-SIB (since this is the only source of revenue that is assumed to be impacted), and varies with the calibration of the TLAC requirement.” These are the estimates used to project possible increases in funding rates. FSB’s Summary of Findings from the TLAC Impact Assessment Studies notes that applying a G-SIB market share of 40%, the median rates described above “translate

into increases in lending rates for the average borrower of about 2.2 bps and 3.2bps,” depending on the calibration.⁸¹

Additionally, the Federal Reserve estimated that the US proposed TLAC and LTD requirements would create a shortfall of approximately \$120 billion for 6 US BHCs, which would translate into an aggregate increased cost of funding of \$680 million to \$1.5 billion.⁸² This would imply that “BHCs would employ an increased lending rate of 1.3 to 3.1 basis points as a result of the proposed external TLAC and LTD requirements,” though it is noted that this is a “conservative estimate of the effect.”⁸³ The industry has had limited consensus around these numbers. In a letter to the Board of Governors of the Federal Reserve System, The Clearing House, SIFMA, American Bankers Association, Financial Services Roundtable, and Financial Services Forum estimate that “the covered BHCs will face an aggregate shortfall in eligible TLAC and long-term debt relative to the TLAC and long-term debt requirements of \$363 billion,” an estimate approximately 3 times larger than that of the Federal Reserve.⁸⁴ As there are currently a limited number of comprehensive studies that evaluate the impact of TLAC on lending rates, particularly in concert with other regulatory reforms, it is possible that the impact could be underestimated.

The cumulative impact of all post-crisis Basel reforms and TLAC requirements on funding rates is not yet fully clear due to multiple factors. The calibration of some of these reforms, as well as interactions with other reforms, are discussed in further detail in Section 5. Comprehensive QIS studies of new proposals, as well as the aggregate reforms, are necessary to understand the full implications of the reforms.

OFFSETS TO INCREASES IN FUNDING COSTS

As discussed above, a number of the studies include an assumption of offsets to the gross impact of Basel reforms on lending rates. These offsets help us calculate the net effect of reforms, as they capture factors that potentially decrease the impact of regulation on banks. Offsets can be driven by factors within or outside a bank’s control.

Offsetting factors within a bank’s control are actions that can be implemented by them to mitigate the impact of reforms. These actions include:⁸⁵

Reducing expenses. In responding to higher costs, banks could attempt to cut their expenses to maintain their margins. Administrative or marketing expenses are likely candidates for these reductions. In practice, in a context of low rates and increased market volatility, banks have widely communicated details of their cost cutting, including reductions of headcounts, transfer of jobs to lower-cost locations, outsourcing and technology. This will be discussed further in Section 1. However, expense cuts have been offset to a substantial extent by the large increase in compliance and risk management expenses in response to the crisis and the new regulations.

Decreasing expected credit losses through tighter loan conditions. Financial institutions can alter lending terms and conditions, such as toughening covenants.

Restructuring their businesses. Banks may decide to exit products and business lines, restructure their organizations, or pursue other strategies to optimize profitability, potentially across multiple jurisdictions.

Other capital actions. Banks can execute mitigating actions such as asset run-offs, asset disposals, asset impairments, and other actions such as RWA optimization.

Most of these actions are described in further detail in Section 1.

⁸¹ FSB and BCBS (2015)

⁸² Federal Reserve (2015b).

⁸³ Federal Reserve (2015b).

⁸⁴ The Clearing House, SIFMA, American Bankers Association, Financial Services Roundtable, and Financial Services Forum to Robert deV Frierson (2016)

⁸⁵ Elliott, Salloy, and Santos (2012)

Additionally, there are a number of other factors *outside* of a bank's control that could mitigate the impacts of reforms.⁸⁶

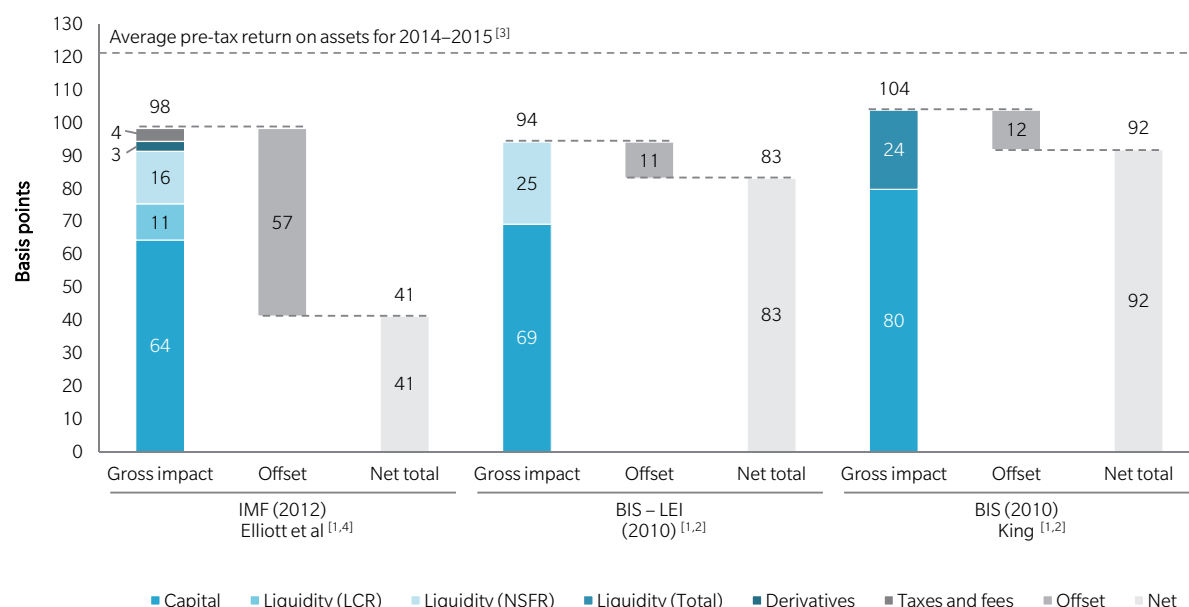
Offsets among reforms. Requirements and incentives created by some reforms, e.g. LCR and NSFR, can be met through the same actions. In the case of LCR and NSFR, the joint requirements of both reforms can be met by increasing HQLA holdings (in the case of NSFR, increasing HQLA holdings is not *required* but is highly beneficial for meeting the overall requirements). Because some of the same HQLA holdings can be counted to meet both requirements, a bank would need to raise less HQLA to meet both requirements simultaneously than if a bank had to meet requirements using two separate stocks of HQLA.

Decrease in the returns demanded by equity and debt holders, reflecting increased safety. The implementation of Basel reforms should lead to greater safety within the banking system, and for individual banks. As such, equity holders may accept a lower return on equity (ROE) allowing the banks to operate at lower profitability and purchasers of bank debt may accept lower interest rates.

IMPACT ON NET LENDING RATES

The estimated impact of these offsets and resulting projected net lending rate increases are illustrated in the graphs below for US, Europe, and Japan. These estimates exclude the impact of reforms post-2012 (i.e. the ongoing workstreams), since these were not addressed in any of the underlying studies.

FIGURE 4.6: IMPACT OF OFFSETTING FACTORS IN THE US



[1] Average impact per 1 percentage point increase in capital is multiplied to account for total projected increase in ratios since 2010

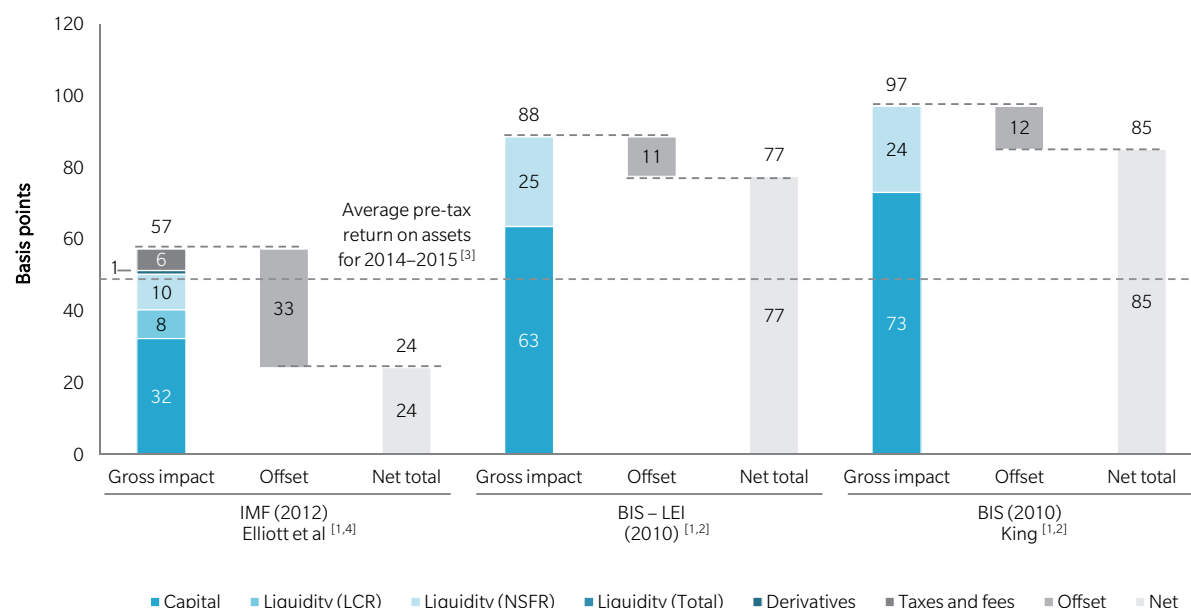
[2] Includes US, Europe, Japan

[3] Average of 2014–2015 return as (total net income before taxes)/(total assets); Source: SNL, Oliver Wyman analysis

[4] Elliott, Salloy, and Santos (2012)

⁸⁶ Ibid

FIGURE 4.7: IMPACT OF OFFSETTING FACTORS IN EUROPE



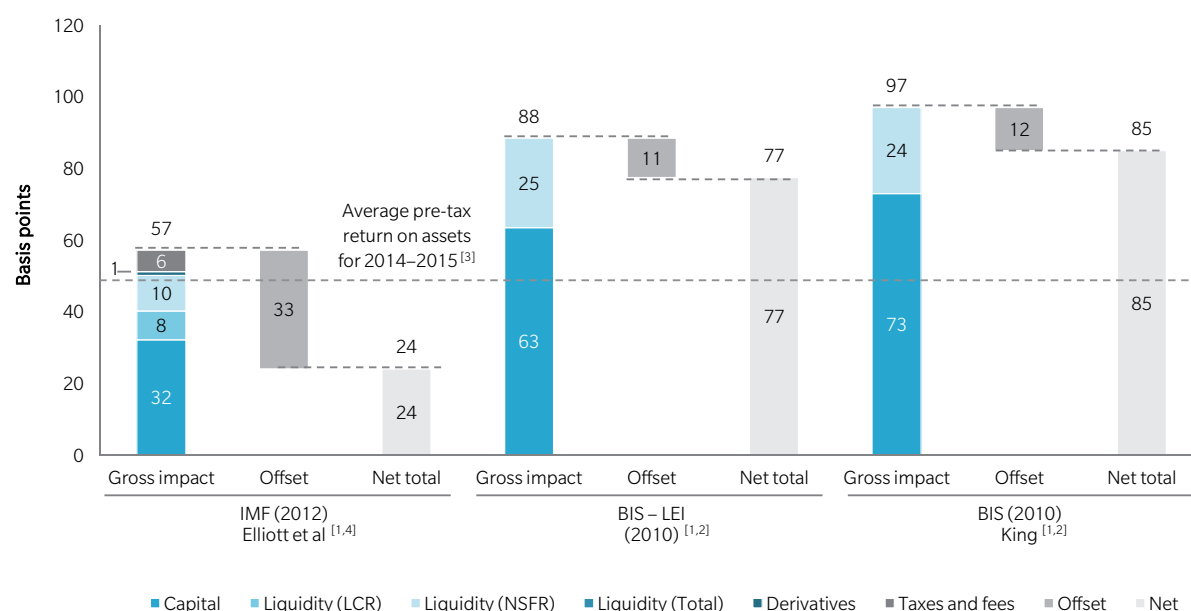
[1] Average impact per 1 percentage point increase in capital is multiplied to account for total projected increase in ratios since 2010

[2] Includes US, Europe, Japan

[3] Average of 2014–2015 return as (total net income before taxes)/(total assets); Source: SNL, Oliver Wyman analysis

[4] Elliott, Salloy, and Santos (2012)

FIGURE 4.8: IMPACT OF OFFSETTING FACTORS IN JAPAN



[1] Average impact per 1 percentage point increase in capital is multiplied to account for total projected increase in ratios since 2010

[2] Includes US, Europe, Japan

[3] Average of 2014–2015 return as (total net income before taxes)/(total assets); Source: SNL, Oliver Wyman analysis

[4] Elliott, Salloy, and Santos (2012)

The offsets calculated by a subset of papers lower the estimated impact of Basel reforms. In most cases though, the net impact of the reforms, in Europe and Japan, remains above the average pre-tax return on assets.

The size of the offsets presented above is driven by the composition of such offsets. The Elliott, Salloy, and Santos (2012) study assumes the offsets to be driven by banks absorbing some of the cost increase of the capital requirements, the overlap of NSFR and LCR actions, banks executing expense cuts (at 5% for Europe, 10% for the US), and executing other adjustments and capital actions.⁸⁷ The largest of these effects is the decrease in required profitability, consistent with a partial application of the Modigliani-Miller theorem. This is a critical difference that distinguishes this estimate from others.

The Basel Committee's Long-term Economic Impact ("the LEI study")⁸⁸ and King (2010) studies, on the other hand, assume a much smaller offset because they analyze only a subset of the offsets reported by Elliott, Salloy and Santos (2012). Both the LEI study and King (2010) derive their offset from the fact that there will be a decrease in RWA and the corresponding lower regulatory capital needs associated with the higher proportion of low-risk assets, which is the expected result of the capital reforms. As such, they expect that liquidity reforms, for their part, will not have the full stand-alone impact estimated by these studies as the asset composition will already have changed to produce greater liquidity.⁸⁹

4.2. LOAN VOLUMES

Another way in which the effects of Basel reforms may flow through to the end users is through impacts on loan volumes.⁹⁰ This impact on loan volumes could be estimated through several different approaches.

Demand. As loan rates increase, the demand for bank lending declines as some subset of the borrowers is no longer willing to pay the higher loan prices.

Supply. Banks restrict the supply of credit to the economy, either on the intensive margin (i.e. the decision of how much to lend conditional on lending at all), or on the extensive margin (i.e. the decision to extend a loan or not irrespective of its amount).⁹¹ Banks could also restrict credit supply across both margins.

General equilibrium. Overall volume of credit is impacted by both the change in supply and demand.

The studies discussed below report the impact for each percentage point increase in the capital ratio. Because the assumption of linearity of impact may not hold for credit volumes, we do not scale the loan impacts to a cumulative amount.⁹²

⁸⁷ Elliott, Salloy, and Santos (2012)

⁸⁸ Cited in the bibliography as BCBS (2010a)

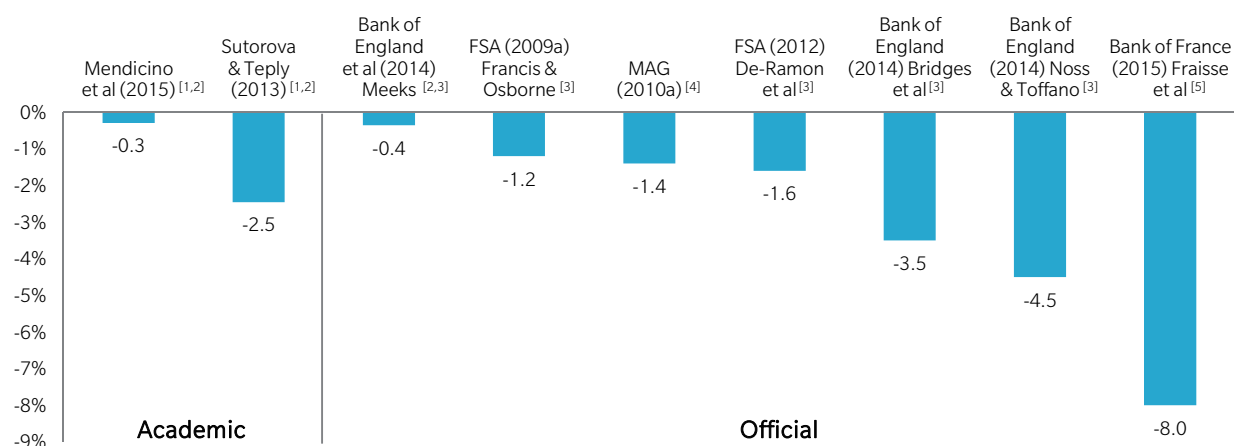
⁸⁹ King (2010), BCBS (2010a)

⁹⁰ Elliott, Salloy, and Santos (2012)

⁹¹ Fraisse et al (2015)

⁹² De Nicolo et al (2014)

FIGURE 4.9: IMPACT OF REFORMS ON LENDING VOLUMES



[1] Europe

[2] Estimate of impact on lending volumes (basis points) of increasing ratio of capital to assets by one percentage point is taken from BCBS (2016) "Literature review on integration of regulatory capital and liquidity instruments"

[3] UK only

[4] US, Europe, and Japan

[5] France only; impact on extensive margin is shown

The majority of studies examining the impact of these reforms have been based on European data, though studies based on OECD estimates point to an average impact that can also be applied to the US and Japan.

As evidenced from the graph above, the overall reduction in lending volumes varies from a 0.3% to 8% decline in baseline levels. On average, Basel reforms could drive an overall reduction of around 2.6% per 1 point increase in required capital ratios. This average impact is somewhat skewed by the highest estimate. When we exclude the highest and lowest estimates, we find an average impact of 2.1%. On the other hand, Gambacorta and Shin (2016) find that a 1% increase in equity to total assets ratio is associated with a 0.6 percentage point increase in annual loan growth as banks with higher capital levels are likely to lend more.⁹³ However, it is important to note that Gambacorta and Shin find a correlation, but do not show causation. It is likely that the correlation reflects the fact that when banks have the capacity to deploy capital, they will make more loans unless loan conditions are notably unfavorable. Thus, there is a major difference between evaluating actual capital levels versus the effects of minimum capital requirements.

In addition to the figures presented above, Cosimano and Hakura (2011) find that a "1.3 percentage point increase in the equity-to-asset ratio required by Basel III is predicted to reduce loans for the 100 largest banks by 1.3 percent in the long run."

There are several key findings in the comparison of estimates of impacts. We first summarize these trends and then discuss each of the research findings in further detail in the appendix.

First, the studies discussed in this report estimate the impact of capital reforms alone on volume, and as such likely underestimate the total impact of post-crisis Basel reforms. Additionally, as discussed in the impact on loan rate sub-section, these estimates do not account for more recent reforms likely to impact banks' risk weighted assets (e.g. limitations on use of internal models, revisions to standardized approaches for credit and operational risk,

⁹³ Gambacorta and Shin (2016)

etc.). Similarly, monetary policy is also likely to contribute to movements in loan supply, and these effects are not considered here.⁹⁴

Second, the methodology used has an impact on the findings. Studies that use DSGE or equilibrium approaches (e.g. Mendicino et al (2015)) tend to estimate lower impacts while regression and reduced-form models tend to estimate higher impacts of reforms. As discussed previously, this is likely due to the fact that DSGE studies are able to adjust for multiple interactive effects in the economy and could include some inherent offsets. However, DSGE are highly complex and require researchers to make a number of parametric assumptions and make decisions about which mechanisms that affect the dynamics of the economy should be incorporated into the model. As such these models rest on quite a number of assumptions that impact the outputs of the studies.⁹⁵

Third, the conceptual approach to estimating the impact on loans also seems to have an impact on the magnitude of findings. Studies that approach loan volume from a bank supply point of view (e.g. Fraisse et al (2015))) tend to estimate higher impacts.

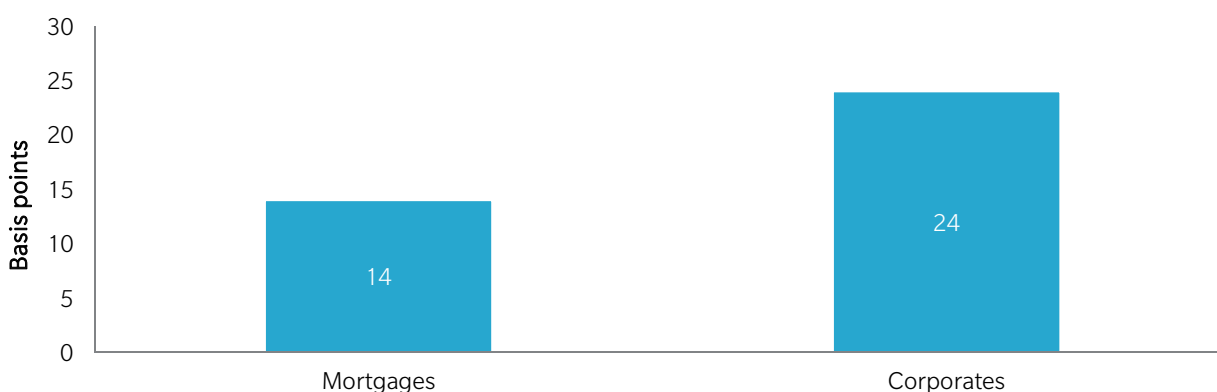
Fourth, some studies estimate the impact of capital increases on the lending growth rate, pointing to declines of 1.2–4.6% from the baseline. However, this estimate is somewhat different from impacts on loan volume and as such is not shown in the comparative chart above.⁹⁶

Detailed discussion of these studies and underlying assumptions can be found in the appendix.

4.3. DISTRIBUTIONAL CONSEQUENCES

The factors discussed above will not impact all banks and all end-users the same way: there will be distributional consequences for market segments and products, for individual banks, and for certain jurisdictions. For example, researchers such as ECB (2015), Mendicino et al (2015), and de-Ramon et al (2012) note that impacts on lending rates and lending volume will not be consistent for all market segments and products.⁹⁷

FIGURE 4.10: IMPACT ON LENDING RATE MARKET SEGMENTS DUE TO INCREASE IN CAPITAL REQUIREMENTS



Notes:

Euro area.

Estimate of impact on lending rates (basis points) of increasing ratio of capital to assets by one percentage point is taken from BCBS (2016) "Literature review on integration of regulatory capital and liquidity instruments".

Reported impact is multiplied by 0.4 to adjust for the difference in impact of an increase in capital to risk weighted assets ratio and an increase in capital to total assets ratio.

Source: Mendicino et al (2015), BCBS (2016h)

⁹⁴ BCBS (2012)

⁹⁵ BCBS (2016h), Sbordone et al (2010), Villaverde (2009)

⁹⁶ Mesonnier and Monks (2014), Aiyar, Calomiris and Wieladek (2014)

⁹⁷ Mendicino et al (2015), ECB (2015), de-Ramon et al (2012)

As shown above, the results of Mendicino et al (2015), which are scaled for our estimated gap between initial and target capital ratios, but do not factor in RWA inflation due to ongoing Basel workstreams, imply that an increase in capital requirements will impact corporate lending almost twice as much as mortgage lending. Since European corporates rely more on bank lending for financing than their American peers, this may result in higher impacts for European corporates. Similarly, de-Ramon et al (2012) find that while, on average, the credit spread for the UK economy will rise by 67 basis points once banks have fully adjusted to the capital requirements, in the short term, the corporate wedge will rise by 126 basis points prior to falling to the long-run average while household borrowing costs will increase continuously over the period. De-Ramon et al (2012) explain that this is driven by the fact that, on average, corporate lending has a higher regulatory risk weight than lending to households (primarily mortgages). Thus, following an increase in capital requirements, banks could raise the prices of the comparatively riskier corporate loans more than the prices of household loans, as in the short run this will allow banks to adjust their risk-weighted assets more efficiently. This disparity could be concerning, as higher rates on corporate loans will raise the cost of funds for non-financial firms and as such could produce negative effects on output while higher household borrowing costs will have an impact on overall welfare through consumption but are not likely to significantly impact output in the long term. Additionally, a widening of bank lending spreads (particularly for corporate end-users) could also reduce investment, especially if wider spreads feed into lending rates available in capital markets or through other non-bank lenders.⁹⁸

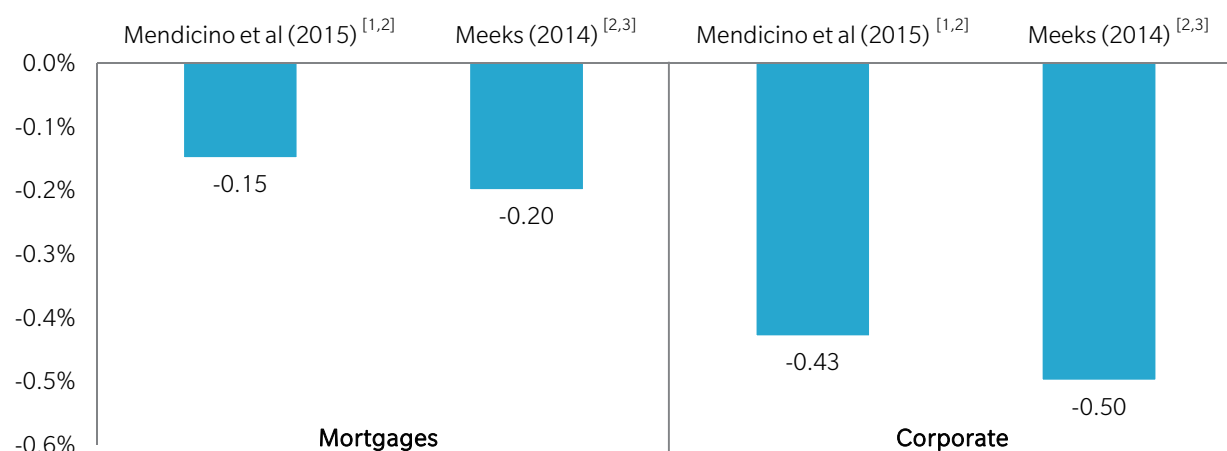
These distributional differences are likely to be exacerbated further by the most recent Basel reforms. A study estimates that under BCBS 347 proposals (Revisions to the Standardised Approach for credit risk) bank spreads for corporate loans increase by between 63 and 103 basis points, with significantly smaller increases expected for residential mortgages. Additionally, the impact of other ongoing workstreams such as revisions to Leverage Ratio (LR) treatment of deposits (see Section 5 for details) is also expected to be significant for corporates.⁹⁹

Similar impacts can be observed in lending volumes.

⁹⁸ Mendicino et al (2015), de-Ramon et al (2012), Barrell et al (2009), Meeks (2014), Cohen and Scatigna (2014).

⁹⁹ Risk Control (2016)

FIGURE 4.11: IMPACT ON LENDING VOLUME MARKET SEGMENTS DUE TO INCREASE IN CAPITAL REQUIREMENTS



[1] Euro area

[2] Estimate of impact on lending rates (basis points) of increasing ratio of capital to assets by one percentage point is taken from BCBS (2016) "Literature review on integration of regulatory capital and liquidity instruments"

[3] Reported impact is multiplied by 0.4 to adjust for the difference in impact of an increase in capital to risk weighted assets ratio and an increase in capital to total assets ratio

Source: Mendicino et al (2015), BCBS (2016h), Meeks (2014)

As indicated above, the findings of Mendicino et al (2015) and Meeks (2014) point to higher drops in volume of corporate than mortgage loans as an increase in capital requirements. Other researchers have been able to identify more granular impacts on the decline in corporate loan volumes. The lending volume to SME's is expected to be more impacted than corporate lending because the higher capital requirements impact instruments with higher risk weights.¹⁰⁰ Similarly, Pessarossi and Vinas (2014) found that small or more opaque firms are particularly hit by the reduction in loan supply for long-term loans, as banks tend to ration loans to these firms while continuing to lend at the same pace to medium and large firms. Furthermore, if safe, but small and opaque, firms are also faced with higher loan rates they may be tempted to turn down the offers and banks may end up attracting only risky counterparties.¹⁰¹ Trade finance and infrastructure financing may also be particularly impacted. Trade finance is crucial to international trade but may be adversely affected by the increase in capital requirements, as well as an increase in equity requirements if the leverage ratio became the binding constraint. Additionally, NSFR RSF factors for trade finance loans could further discourage banks from making trade finance loans (vs. other lending) or could drive banks to increase their pricing. Some believe that trade finance products should be differentiated from other off-balance sheet instruments due to their relatively low risk and short term nature. Though the Basel Committee has issued some adjustments to account for the characteristics of trade finance, many believe that the rules still do not fully acknowledge the low-risk nature of trade finance products. The impact of a shrunken trade finance market is a particular concern for emerging countries. A discussion on the differing impacts across regions is expanded later in this section.¹⁰²

Reform may also reduce infrastructure financing, which is a long-term asset that requires banks to obtain the more expensive long-term funding, at least when viewed on a stand-alone basis. In situations when capital requirements and NSFR rules could discourage banks from maintaining long-term funding, banks may become unwilling to issue infrastructure loans, which are, again, particularly important to countries that are not fully developed. Additionally,

¹⁰⁰ Sheng (2013)

¹⁰¹ Mendicino et al (2015), Meeks (2014), and Pessarossi and Vinas (2014)

¹⁰² Sheng (2013), Brandi, Schmitz, and Hambloch (2014), Malesova (2015), BAFT to BCBS (2014)

large haircuts may apply to the underlying collateral, which may further dissuade banks from participating in this market.¹⁰³

The impairment of bank intermediation, with higher loan prices or lower loan volumes, may drive customers to the shadow banking sector. This issue is discussed in further detail in Section 5.

Second, reforms will not impact all banks in the same way. Researchers find that banks that are harder hit by regulatory requirements (i.e. banks with a low existing capital buffer or banks with a higher existing liquidity risk) are likely to have a stronger response in terms of rise in loan prices or reduction in bank loan supply. Impact for banks will also differ based on current practices. For example, banks that are heavy users of favorable internal models to measure credit risk will be much more impacted by limitations on the use of internal models than banks that use standardized approaches. Cosimano and Hakura (2011) find that banks in countries affected by the recent financial crisis will be more impacted than banks in non-affected countries. Thus, the impacts to end-users would be different based on which bank they are engaged with.¹⁰⁴

Third, the impact of reforms could differ based on economic level of development of a particular country. Comparatively less research has focused on impact of reforms on developing nations, as banks in developing nations frequently already operate above the minimum capital and liquidity requirements ratios due to higher expected volatility and higher losses (e.g. significantly higher non-performing loan rates in Africa.) For these banks, the increase in minimum capital requirements and the countercyclical capital buffer are likely to be too low to bind as a constraint to excessive credit growth.¹⁰⁵

However, others researchers have noted that capital reforms could also pose unique challenges for emerging markets. For example, Sabunwala (2012) notes that for emerging markets the regulatory reform agenda is closely linked to the financial development agenda. The author notes that higher capital requirements may come at a cost of slower economic development as banking will become modestly more expensive (loans will become costlier and harder to get). In developing markets this may be particularly challenging. Additionally, a Basel study indicated that emerging markets and developing economies (EMDEs) continue to indicate that some reforms, e.g. policy measures for G-SIBs, liquidity reforms, etc., could have potential adverse implications. For example, EMDEs could have less access to HQLAs required by liquidity reforms, leading them to adopt alternative liquid asset (ALA), which would present unique challenges. This is further discussed in Section 5.¹⁰⁶

Additionally, impacts on emerging markets will be compounded by other direct and indirect effects. First, the provision to exclude minority interests from capital raises operating costs for many developed nation banks operating in emerging markets. This may make maintaining emerging market presence less attractive for developed nation banks and could lead to possible reductions in operations or even withdrawals from these markets. A Basel study noted that deleveraging by internationally active banks is a continued concern for EMDEs. Second, transmission mechanisms of cross-border capital flows could further exacerbate the effects on emerging markets. All in all, it is clear that impacts of Basel reforms are likely to differ across jurisdictions and levels of development.¹⁰⁷

¹⁰³ Sheng (2013)

¹⁰⁴ Cosimano and Hakura (2011), Memmel and Raupach (2007), Pessarossi and Vinas (2014), Macquarie Equities Research (2016)

¹⁰⁵ Kasekende, Bagyenda, Brownbridge (2011)

¹⁰⁶ Kasekende, Bagyenda, Brownbridge (2011), Sabunwala (2012), BCBS (2014)

¹⁰⁷ Ibid

5. IMPACTS ON CAPITAL MARKETS

The primary focus of this section is to discuss the findings of studies by academics, officials, and other industry observers on the *overall* impact of Basel reforms on capital markets, supplemented with more detailed analysis where market data is available¹⁰⁸.

Academics have focused their analysis so far on market liquidity given its significance for the efficient functioning of capital markets. An adverse impact on market liquidity could result in rising transaction costs for investors, higher price volatility, lower prices for existing bonds, more expensive fund raising for businesses, governments, and, indirectly, households, and, a greater potential for periods of market instability.¹⁰⁹

Higher direct transaction costs may come about as a result of banks passing on higher costs to end users, which could be exacerbated by lower market liquidity forcing dealers to recover fixed costs over a smaller activity base. The speed and extent of price movements (volatility) could be increased if it is more expensive or harder to trade and volumes are consequently lower. Lower liquidity could reduce the return for investors who are buying or selling in large size. Bond prices could also fall as investors increase the liquidity risk premium that they demand, raising the overall required interest rate. Similarly, an increase in the liquidity premium would mean that investors would demand higher interest rates on new issues, resulting in increased cost of funding for non-financial corporates.¹¹⁰

Other types of impacts on capital markets have not been analyzed extensively in academic and industry publications. As a result, the impacts covered in this report are not exhaustive. For example, the following, among others, are not studied in this report:

- Increased client segmentation by market makers and narrowing of service offerings to select customer segments, resulting in increased concentration risk for end users.
- Decreased product choice, with products being discontinued or offered at a prohibitive cost, resulting in the retention of basis risk by end users unable to adequately hedge their transactions.

A comprehensive analysis of the impact on capital markets is challenging for multiple reasons. The impact of reforms has not yet fully materialized, in part due to the reasons described below, and as a result, empirical evidence based on existing market conditions likely understates the ultimate effects of these reforms:

- The impact of Basel reforms on capital markets are masked to some extent by how recently some key reforms have been introduced, such as the Liquidity Coverage Ratio. Other reforms, such as the Leverage Ratio, the Net Stable Funding Ratio, margin requirements for non-centrally cleared derivatives and the FRTB are yet to be implemented across jurisdictions. Banks and large dealers are likely to make more significant changes as full implementation occurs.
- The unconventional monetary policies followed by central banks across the globe have continued to inject unprecedented amounts of liquidity into the economy with spillovers into capital markets, further complicating this analysis.
- Much of the impact on the volume and price of market liquidity offered by banks and large dealers is dependent on changes to capital allocation and internal pricing mechanisms for capital and liquidity. Industry participants have remarked that banks are still in the process of determining how to revamp their approaches, creating a response delay.

¹⁰⁸ The scope of the report excludes therefore the interaction of the Basel rules with the evolution of market structures rules (such as MIFID II in Europe for instance)

¹⁰⁹ Elliott (2015)

¹¹⁰ Ibid

- It appears likely that the necessary changes in prices and other conditions offered to customers in regard to market liquidity are too drastic for banks and large dealers to achieve in one step. Experience has shown over many years that if an industry leader changes their offering too radically in one step, they permanently lose some of their customers to competitors who get to the same place by taking it more slowly. As a result, it seems likely that price and other changes are being spread over time for these competitive reasons as well.
- Market participants have adjusted to the new market conditions in a number of ways, including investors breaking up trades into smaller pieces and lengthening entry or exit timeframes. This may not be sustainable in the long term, particularly under more volatile conditions when large volumes may need to be rapidly transacted. One possible consequence is a pro-cyclical increase in market illiquidity when least desirable.

GFMA, IIF and PwC (2015) studied the aggregate impacts of recent regulations on global capital markets, highlighting the important linkages between financial services regulation and capital markets liquidity, with a focus on the impact on end users. However, due in part to the reasons discussed above, the evidence collected by the study points to a range of effects on capital markets, with varying degrees of impact across products and segments. Other studies such as CGFS (2016), Mizrach (2015), and the Joint Staff Report on the US Treasury market¹¹¹ have studied specific market segments and found that price-based metrics such as bid-ask spreads do not generally point to liquidity issues, whereas volume based measures indicate changes in market structure and functioning that may be symptoms of reduced market liquidity. Observations from industry participants, however, suggest substantially greater impacts than these more formal reports do.

There is an active policy debate about the quantitative impact of financial regulation on market liquidity, but there is broad agreement among observers regarding the expected *directional* impact of Basel reforms on the functioning and liquidity of capital markets, if not the magnitude of effects.

Large banks and dealers subject to the Basel rules have traditionally been major participants underpinning financial markets. The new regulations have already caused a sharp pullback in their activities in certain market segments, as shown by levels of trading inventories and other measures. All else equal, this clearly reduces market liquidity. This is supported by analysis performed by some regulatory bodies. For example, the Bank of England's recent Financial Stability Report finds that "there has been some reduction in the liquidity of some government and corporate bond markets in recent years" and that "post-crisis regulation, including the leverage ratio, have probably been one driver of these developments"¹¹². There are some offsets that may be triggered by these regulations, such as giving room for smaller dealers to compete more effectively and therefore grow, but they would be only partial. The debate therefore centers on whether other unrelated changes in the market environment can sufficiently fill the remainder of the gap so as to ensure orderly, well-functioning two-way markets in both normal and volatile conditions.

Another element of the debate is the question of the proper level and price of liquidity from a societal point of view. Virtually everyone accepts that liquidity risks were underpriced prior to the crisis and therefore, the goal should not be to turn back the clock to those levels of availability and price. However, there is no agreed upon standard for what represents an appropriate level of market liquidity. Comparisons will often be made in the rest of this section between current and pre-crisis levels, to provide historical perspective, but this is not meant to imply that a return to those levels is the desired policy outcome.

During the 14th BIS Annual conference, where regulators debated the "new normal" in financial markets, the former Deputy Governor of the Bank of England, Paul Tucker deemed that the adaptation of markets participants and infrastructure to today's environment would take "quite a long time, perhaps five to ten years"¹¹³. He also noted that "in the meantime, markets might occasionally be very bumpy and it would be reckless to assert that

¹¹¹ US Department of Treasury, Board of Governors of the Federal Reserve, Federal Reserve Bank of New York, US SEC, and CFTC (2015).

¹¹² Bank of England (2016)

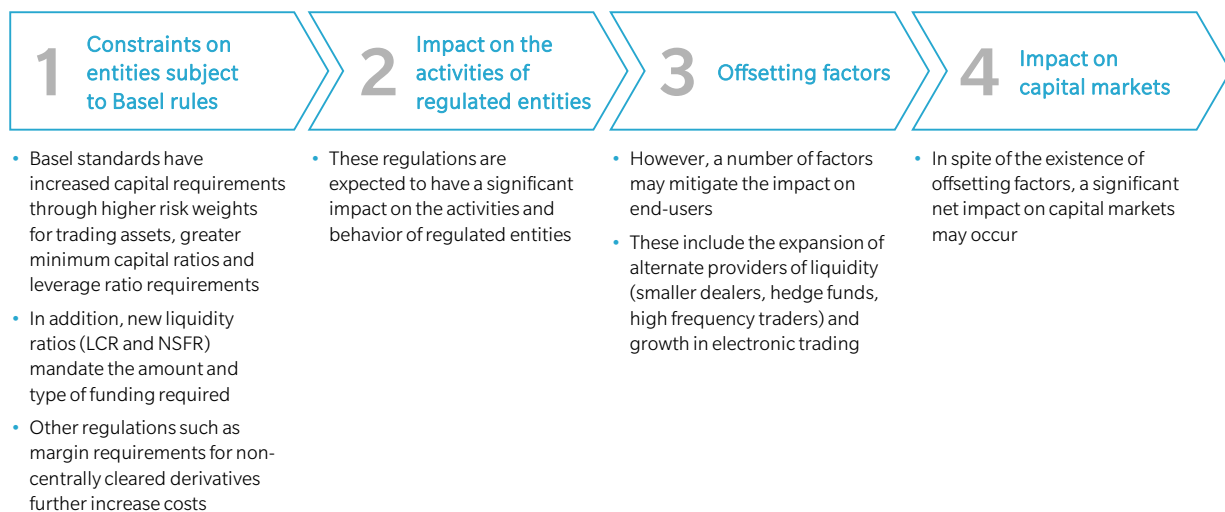
¹¹³ Caruana, Kay, and Tucker (2015)

none of those bumps would do economic harm". It is not clear that public authorities and academics have determined the targeted end state, together with the transition path.

For the reasons mentioned above, we encourage authorities and the industry to look beyond liquidity and extend the scope of analysis to include structural impacts on the functioning of markets, the products that are needed and offered, concentration risk, and basis risk for end users.

Since the impact of regulatory reform has only partially fed through into observable impacts on end users, a detailed analysis of the pressures on regulated entities and their expected downstream effects is necessary to assess the future impact of these reforms. Therefore, the remainder of this section follows the structured analysis outlined in Figure 5.1.

FIGURE 5.1: OVERVIEW OF THE DIFFUSION OF REGULATORY IMPACTS ON CAPITAL MARKETS



5.1. CONSTRAINTS ON BANKS AND LARGE SECURITIES DEALERS

In the post-crisis environment, financial institutions have faced very significant changes to regulatory standards and additional revisions are on the horizon. The new Basel regime imposes greater capital as well as liquidity standards on regulated financial institutions that are internationally active and some jurisdictions extend the rules to be more stringent.

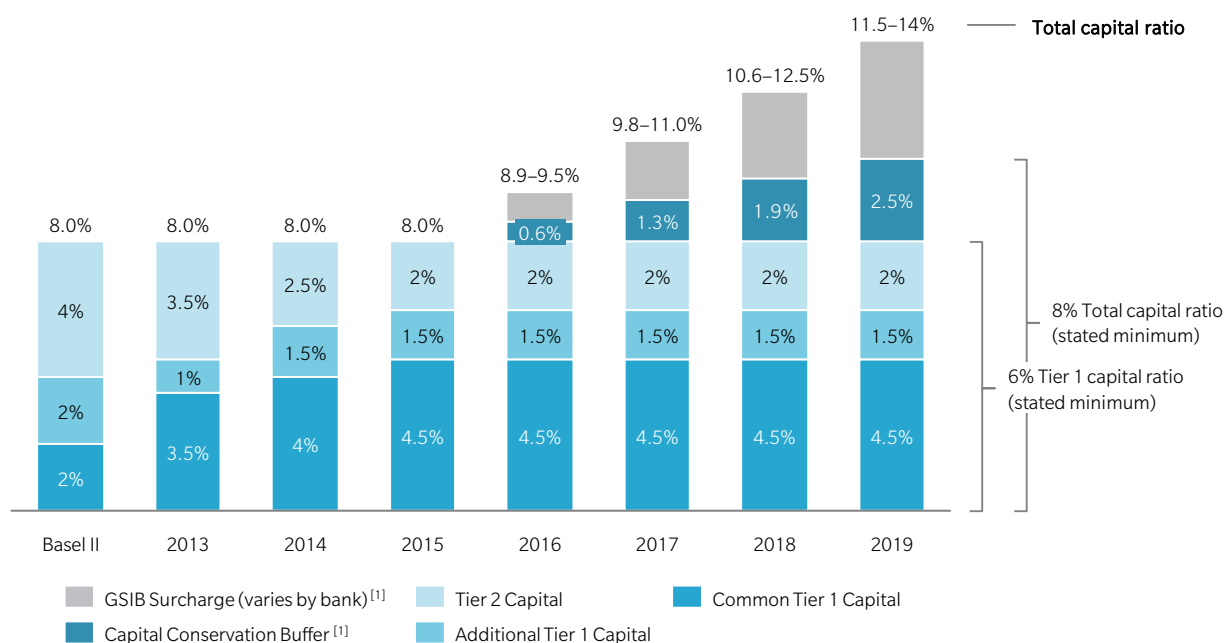
CAPITAL REQUIREMENTS

The global financial crisis demonstrated that trading book assets were not as liquid as previously believed by market participants and regulators. As market liquidity dried up during the financial crisis, some banks were unable to offload their risk positions and incurred large losses. As a result, Basel 2.5 introduced significantly higher risk weights to the trading book, differentiated by product. More recent Basel initiatives, such as the FRTB, will further increase the risk weights across most products.

In addition to altering risk weights, Basel III rules increase minimum capital ratios and introduce new capital buffers, thus requiring banks to have greater capital as a proportion of risk weighted assets. Further, recently finalized or ongoing workstreams, such as FRTB and IRRBB, are expected to result in an additional increase in capital requirements. However, given the fact that some of these reforms are not yet finalized or implemented, it is difficult to quantify their impact, especially at the product level. For G-SIBs, an additional surcharge calculated based on size, interconnectedness, and global scope is added to the capital requirements in order to reduce the probability

and the impact of their failure.¹¹⁴ Regulators have also proposed additional rules around the total loss absorbing capacity (TLAC) to be maintained by G-SIBs, setting minimum levels for instruments that can be legally, feasibly and effectively written down or converted into equity in case of resolution. These rules have raised capital requirements for all banks, especially for large banks as shown in Figure 5.2.

FIGURE 5.2: BASEL III CAPITAL REQUIREMENTS¹¹⁵



[1] GSIB surcharge and Capital Conservation Buffer are to be met with CET1 capital
 Source: BCBS (2013c), Board of Governors of the Federal Reserve System (2015)

Basel III also introduces a non-risk sensitive “leverage ratio” requirement, and for many banks, this will result in a further increase in capital requirements. In fact, a survey commissioned by the GFMA and The Clearing House showed that the leverage ratio was expected to become the binding capital constraint for more than half of the banks surveyed globally.¹¹⁶ Further, it should be underlined that the leverage ratio is the primary constraint for trading on government bonds and fully collateralized and/or centrally cleared derivatives, when evaluated on a stand-alone basis. This could directly affect activity levels and pricing for those firms for whom the leverage is a binding constraint. For completeness, it should be noted that in some jurisdictions, the binding capital constraint may come from stress tests and not the Basel rules.

Additional detail on Basel risk weights and capital requirements is provided in Appendix A.

¹¹⁴ BCBS (2013g)

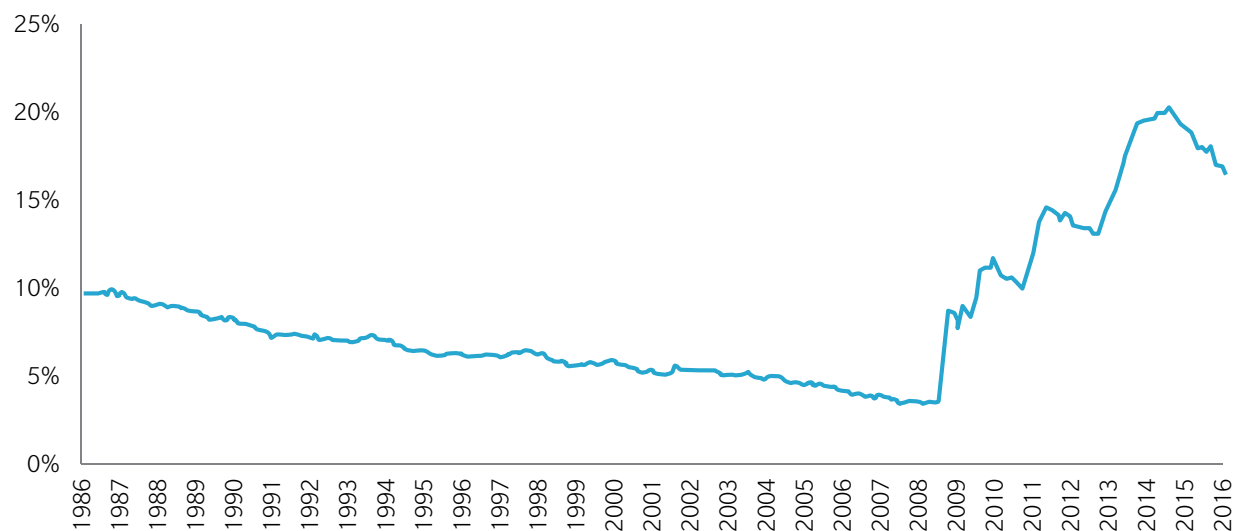
¹¹⁵ US G-SIB buffer shown

¹¹⁶ Basel III leverage ratio survey, September 2013, commissioned by the GFMA and The Clearing House as part of industry response to the consultative document on the leverage ratio framework released by the BCBS on September 20, 2013. The study showed that the leverage ratio becomes the binding requirement for over 54% of institutions for a leverage ratio of 3% and rises to 90% for a leverage ratio of 5%. The study covered 26 banks across Europe, US, Canada, and Japan, including 18 G-SIBs

LIQUIDITY REQUIREMENTS

Basel III introduced two new mandatory liquidity ratios – the LCR (Liquidity Coverage Ratio) and the NSFR (Net Stable Funding Ratio). In order to maintain a sufficient inventory of high quality liquid assets (HQLA) to meet the LCR requirements, banks will have to sharply increase their inventory of HQLA compared to pre-crisis levels. Figure 5.3 below shows that cash as a percentage of the banking system assets in the US has gone from a pre-crisis low of 3% to a post-crisis high of 20%. Though this observed increase in HQLA is not distributed equally across banks and is particularly concentrated in foreign banks operating in the US, trust banks, G-SIBs, and brokers¹¹⁷, a possible linkage may still exist between the increase and banks ramping up their liquidity reserves in an effort to be compliant with the LCR requirements.

FIGURE 5.3: CASH AS A % OF ASSETS – ALL BANKS



Source: Foran, Moszkowski, and Elliott (2016)

The NSFR aims to reduce banks' reliance on short-term funding by ensuring that a sufficient amount of stable long term funding is held to match funding-weighted assets based on the maturity characteristics of a bank's balance sheet components. NSFR and LCR requirements force banks to hold low return assets, creating a drag on profitability since the higher credit quality and greater liquidity of those assets imply lower returns than alternatives.

Other potential issues relating to NSFR and LCR requirements are discussed in section 5. And, additional detail on Basel liquidity requirements is provided in Appendix A.

¹¹⁷ Foran, Moszkowski, and Elliott (2016)

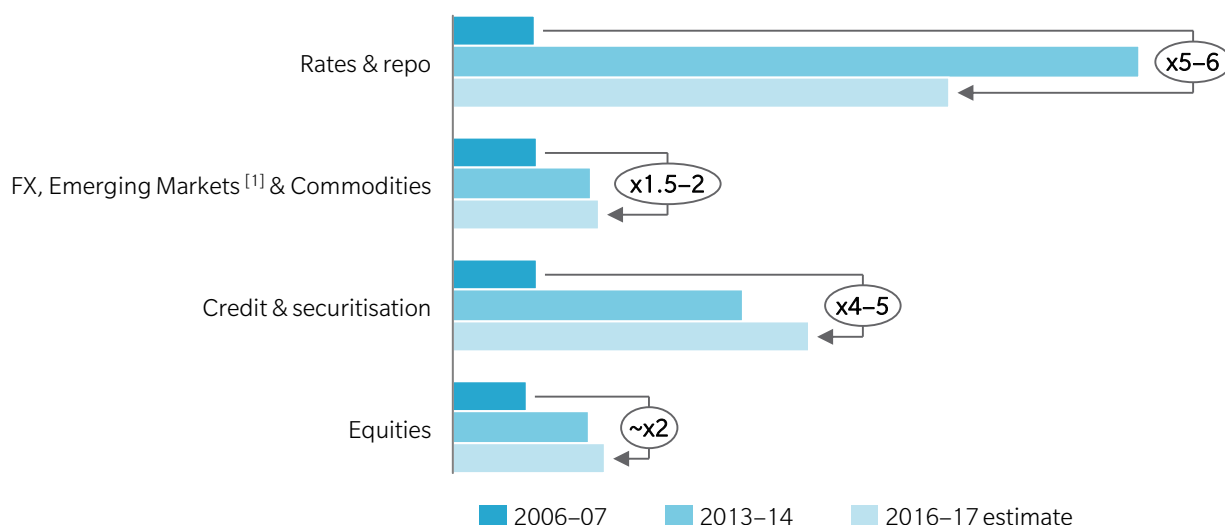
5.2. IMPACT ON THE ACTIVITIES OF BANKS AND LARGE SECURITIES DEALERS

The implications of regulatory changes discussed in Section 5.1 span beyond banks' profitability, and are resulting in changes to market structures. The rest of this section discusses the impact on capital markets in more detail.

SHRINKAGE IN MARKET MAKING AND TRADING ACTIVITIES

Traditionally, banks have played a central role as intermediaries to facilitate liquidity in the markets through their market-making activities. However, increases in capital and liquidity requirements have pressured the market-making business model by increasing the cost of providing intermediation services and driving down profitability. For example, the increase in capital consumption per dollar of revenue due to changes in the Basel capital regime is demonstrated in Figure 5.4. Oliver Wyman and Morgan Stanley (2015) predict that resource consumption will continue to increase across asset classes in 2016 and 2017, with the exception of rates and repos where banks are expected to streamline the business through lower capital allocation for segments generating low returns. And, in low margin market making activities, the combined Leverage Ratio and NSFR costs are estimated to impact funding costs in the 60bps–110bps range.¹¹⁸

FIGURE 5.4: ESTIMATED DEALER FINANCIAL RESOURCE CONSUMPTION/REVENUES, 2006–2017E



[1] Includes emerging market rates, FX and credit. 2006–07 based on Basel II RWA, 2013–14 and 16–17 based on a blended average of leverage balance exposure and Basel III RWA; Revenue outlook based on OW base case revenue projections to 2017; 2017 Includes impacts of FRTB, leverage ratios, and structural reform in rates
Source: Oliver Wyman and Morgan Stanley (2015)

In a context of increased costs of engaging in market-making activities and high regulatory uncertainty, shareholders, boards and the executive management of banks are less inclined to allocate more capital to trading activities, resulting in decisions to scale back on their activities or to exit certain markets altogether. Accordingly, the expected increase in regulatory requirements has driven a pro-active downsizing of inventories and risks. Some firms have already taken both these types of actions. The impact is likely to be most acute for capital and funding-heavy areas of the business, such as making markets in fixed income products.

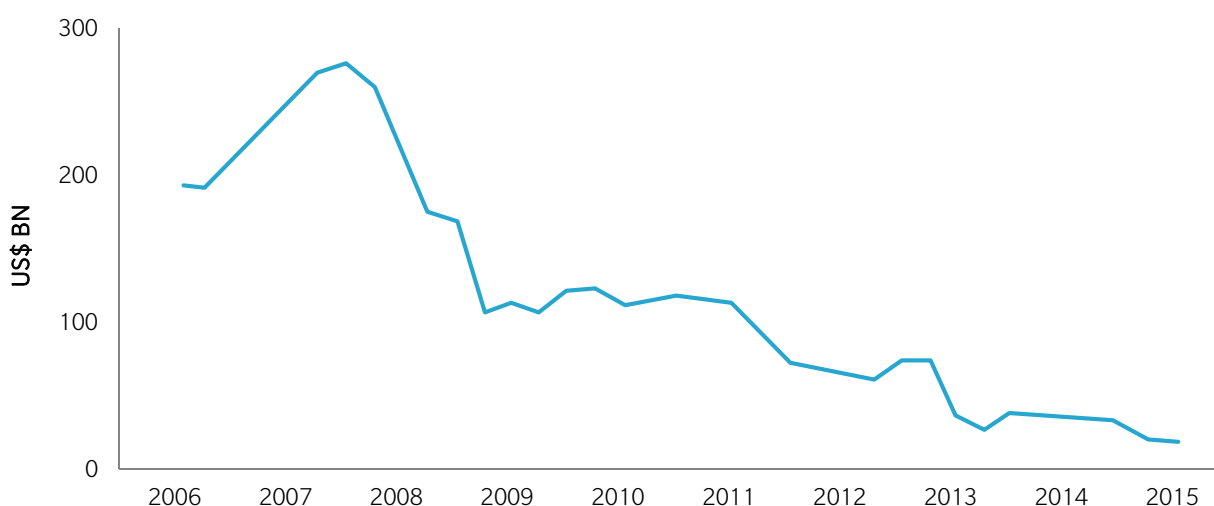
Ring-fencing of trading activities in Europe and an outright prohibition on proprietary trading under the Volcker Rule have led to a further decline in banks' holdings of trading assets. Curtailing banks' trading activities could lead

¹¹⁸ AFME (2016)

to a reduction in the size of markets for these assets, with negative consequences for market liquidity. According to Oliver Wyman (2012), the impact on market liquidity would be most evident in corporate bonds, private ABS, and OTC derivatives.

Figure 5.5 shows that net positions of corporate bond assets for key dealers in the US corporate bond market have significantly declined post-crisis and have not yet returned to the pre-crisis levels. What is perhaps more concerning is the continuous decline in inventories since 2011. Similarly, corporate bond holdings of financial institutions in Japan and the euro area have declined by more than 25% in both economies over the past five years¹¹⁹. The ramifications of this decline in the access of non-financial firms to capital markets should be analyzed further.

FIGURE 5.5: NET POSITIONS OF PRIMARY DEALERS – US CORPORATE BONDS



Source: CGFS (2016)

More broadly, according to Oliver Wyman and Morgan Stanley (2016), “global wholesale banking balance sheets supporting traded markets have contracted by 50% in RWAs on a Basel III adjusted basis, implying 25–30% in terms of total balance sheets, since 2010”. Table shows historical and forecasted balance sheet reductions by product. This points to a significant reduction in dealers’ market making capacity, potentially leading to a substantial impact on market liquidity.

TABLE 5.1: BALANCE SHEET REDUCTIONS, 2010–15 (% CHANGE)

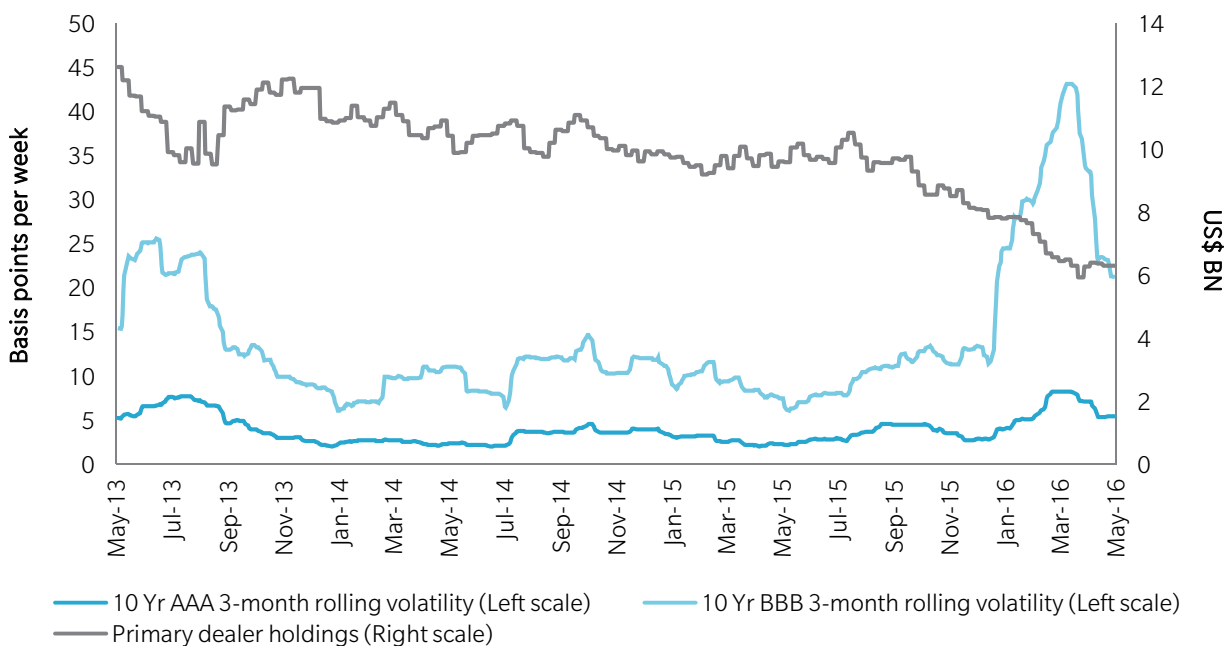
PRODUCT	2010–15	NEXT 3–4 YEARS
Repo	Down ~50%	Down ~10%
Prime	Up ~20%	Flat
Bonds, FX & commodities	Down ~25%	Down ~10%
Structured & securitized	Down ~20%	Down ~10%
Listed, flow & cleared products	Down ~20%	Down ~5%
Issuance & advisory	~ Flat	Down ~5%
Total	-25% to -30%	-5% to -10%

Source: Oliver Wyman and Morgan Stanley (2016)

¹¹⁹ CGFS (2016)

Recent events in the US CMBS¹²⁰ market illustrate a decline in market liquidity that may be caused in part by these changes. In February 2016, fears surrounding China's economic performance and oil prices triggered a sudden sell-off in CMBS by hedge funds. But, due to significantly reduced dealer inventories, banks were unable to provide liquidity, resulting in a sudden drop in prices of ~20% within a few weeks¹²¹. As shown in Figure 5.6, lower rated securities were particularly impacted, with high price volatility in the first half of 2016.

FIGURE 5.6: CMBS PRICE VOLATILITY AND LIQUIDITY



Source: J.P. Morgan, Federal Reserve Bank of New York (from Western Asset (2016))

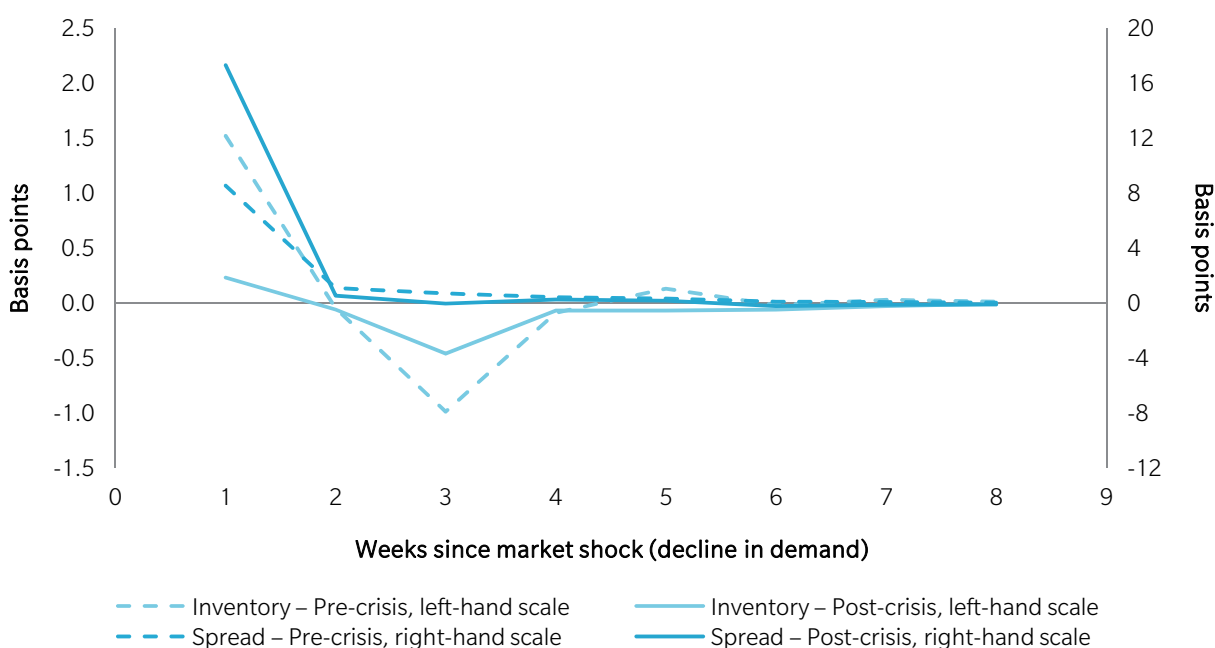
The Bank of England's recent Financial Stability Report also finds that market makers in US corporate bonds have become less willing to absorb demand shocks and that the volatility of spreads has increased as a consequence.¹²² As shown in Figure 5.7, during the pre-crisis period, in response to a one standard deviation reduction in demand for corporate bonds, dealers absorbed the shock by continuing to buy bonds, thereby increasing their inventory by more than 1.5 bps of the market size in the first week. A shock of this magnitude resulted in a 9 bps increase in spreads. However, in the post crisis period, in response to a similar shock, dealers only increased their inventories by 0.2 bps, thus absorbing very little of the excess supply. Furthermore, the post-crisis shock resulted in a spread increase of 18 bps, which was twice as much as the spread increase observed in the pre-crisis period.

¹²⁰ Commercial Mortgage Backed Securities

¹²¹ PIMCO (2016)

¹²² Bank of England (2015b)

FIGURE 5.7: DEMAND SENSITIVITY OF US\$ HIGH YIELD CORP. BOND SPREADS AND DEALER INVENTORY



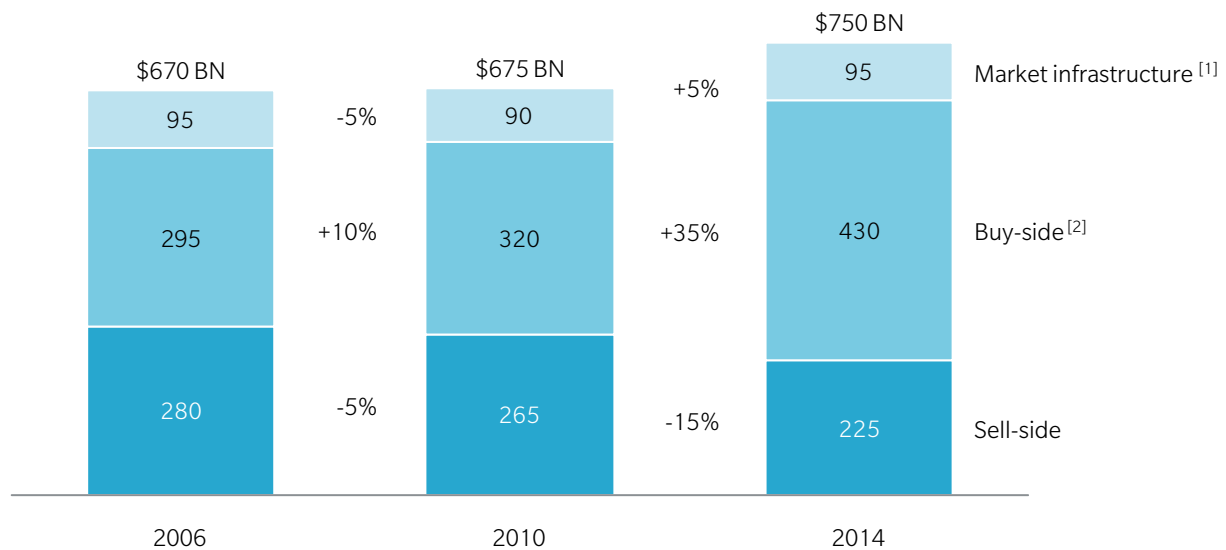
Notes: Changes in US dollar-denominated high-yield corporate bond spreads and US primary dealers' inventory in these securities due to a one standard deviation decline in demand for corporate bonds from asset management companies; Changes in inventory measured as fraction of market size; Pre and post-crisis defined as 2004–06 and 2012–February 2015 respectively

Source: BofA Merrill Lynch Global Research, Dealogic, EPFR Global, Federal Reserve Bank of New York, and SIFMA data (from Bank of England (2015b))

An analysis of the distribution of global securities revenues by market participants (Figure 5.8) shows that sell-side revenues fell by 20% (\$55 BN) between 2006 and 2014 while buy-side revenues grew by 45% (\$135 BN) during the same period. This provides additional evidence of reduction in the market share of banks and large securities dealers.¹²³

¹²³ Industry revenues are not necessarily perfectly correlated with trading activity; nevertheless revenues are used as a proxy demonstrating the declining market share of the regulated institutions. However, we acknowledge that there were other significant factors as well, for example, huge flows into fixed income funds (partly a byproduct of expansionary monetary policy) drove assets under management (AUM) higher, which in turn drove fees higher. Further, decreasing sell-side revenues may be driven by changes in pricing in addition to a reduction in trading activity.

FIGURE 5.8: GLOBAL SECURITIES REVENUE POOLS BY PLAYER (2006–2014)



[1] Includes execution venues (exchanges, inter-dealer brokers, clearing houses, CCPs), CSDs, custodians and data providers

[2] Includes Asset Managers and Hedge Funds

Source: BofA Merrill Lynch Global Research, Dealogic, EPFR Global, Federal Reserve Bank of New York, and SIFMA data (from Bank of England (2015b))

BUSINESS RESTRUCTURING AND EXITS

Banks are likely to reassess their business strategy and optimize their capital and liquidity resources to increase efficiency and maintain competitiveness in the new, increased regulatory cost environment. This is often accomplished by employing strategies to focus away from non-core activities, or reevaluating the product and asset mix offering, which may lead to exits from certain segments of the market. This may in turn increase “liquidity bifurcation” with liquidity concentrating in the most liquid instruments as banks focus their activities on similar products and segments.

Figure 5.9 contains analysis from a study by AFME and PwC (2014b) summarizing changes in organization structure and market exits by major global banks between 2009 and 2014. A vast majority of global banks studied have undergone significant restructuring, exited certain products or regions, or redefined and reduced focus on non-core activities. Table 5.2 contains some noteworthy examples that highlight these changing dynamics.

FIGURE 5.9: CHANGES IN STRUCTURE AND ACTIVITIES OF MAJOR BANKS (2009–2014)¹²⁴

Source: AFME and PWC (2014b)

TABLE 5.2: EXAMPLES OF GLOBAL BANKS EXITING OR SHRINKING WHOLESALE BUSINESSES

NAME	EXITS	STATED RATIONALE
Morgan Stanley	Reduced fixed income risk-weighted assets from US\$370 BN in 2011 to US\$132 BN in 2016 ¹²⁵	Strategic changes due to regulatory pressures and changing market dynamics
	Sold oil trading business in 2015 ¹²⁶	
	Sold in-house quantitative trading unit in 2013 ¹²⁷	
Bank of New York Mellon	Shutting down derivatives sales and trading business ¹²⁸	Regulatory restrictions on proprietary trading To streamline operations and remain competitive in a new regulatory landscape, specifically related to new capital and liquidity requirements
State Street	Announced closure of swaps business in 2014 ¹²⁹	Changes in market and regulatory factors driving decline in demand for OTC derivatives
BNP Paribas	In 2011, made plans to cut corporate- and investment-banking balance sheet by US\$82 BN, mostly in capital-markets activities ¹³⁰	Efforts to increase CET1 capital ratio under Basel III rule
	Cut assets by curbing lending and through sales and other business disposals ¹³¹	
Credit Suisse	Announced decision to scale down prime brokerage unit ¹³²	Improve leverage ratios and boost profitability

¹²⁴ No. of banks included in study: 24¹²⁵ Morgan Stanley (2015), Morgan Stanley (2016)¹²⁶ Meyer, G. and Hume, N. (2015)¹²⁷ AFME and PwC (2014b)¹²⁸ Brush, S. (2014)¹²⁹ Ibid.¹³⁰ Choudhury, A., Griffin, D. and Xydias, A. (2011)¹³¹ Benedetti-Valentini, F. (2011)¹³² Srivatsava, S., Bart, K., Miles, T. (2014)

NAME	EXITS	STATED RATIONALE
	Announced plans to reduce leverage exposure from trading operations by US\$74 billion ¹³³	
	Announced exits from European securitized product trading, distressed debt, and long-term illiquid funding markets ¹³⁴	Cost reduction
Crédit Agricole	Exited commodities in October 2011 ¹³⁵	Increased regulatory requirements
Citigroup	Announced sale of margin foreign exchange business (including CitiFX Pro and Tradestream platforms) ¹³⁶	Strategic sale to streamline its operations
RBS	Exiting MBS, commercial real estate, commercial mortgage-bond sales and trading, and significantly reducing other investment banking activities ¹³⁷	To stay below US\$50 billion asset trigger for heightened FRB capital requirements and other restrictions. Other foreign banks expected to restrain growth that would take them over the limit
UBS	Exiting automated US options market-making activities ¹³⁸	New regulatory requirements and fragmented exchange structure have made the business too costly
	Exited FICC Asset Securitization, FICC Complex Structured Products, and FICC Macro Directional Trading in 2011, and scaled back FICC Global Correlation ¹³⁹	Portfolio optimization driven by capital requirements
Goldman Sachs	Sold its aluminum business ¹⁴⁰	Regulatory scrutiny
	Reduced asset size by 24% from 4Q07 to 4Q14 ¹⁴¹	Post-crisis regulatory pressures to shrink
	Reduced its repo activity by about US\$42 billion in the first six months of 2014 ¹⁴²	New capital requirements
Barclays	Exited global commodities activities ¹⁴³	In line with “objective to actively evaluate and manage our businesses, ensuring they meet strict economic and strategic criteria within the new regulatory environment”
	Reduced repo lending by ~US\$25 billion in the first half of 2014 ¹⁴⁴	New capital requirements
HSBC	Reduced Global Banking and Markets RWA by 31% by exiting legacy credit and managing down long dated rates and low returning portfolios; Reduction in the GBM client base by 20% ¹⁴⁵	Anticipation of regulation driven growth; Simplify GBM business; Allocation of more capital to strategic priorities
JP Morgan	Reduced non-op deposits by US\$100 billion in 2015 ¹⁴⁶	Product is non-core to its customers with outsized operational risk and capital charges

¹³³ Forbes (2014)¹³⁴ Credit Suisse (2016)¹³⁵ Hamaide, S. and Johnson, C. (2011)¹³⁶ Bases, D. (2015)¹³⁷ Sharma, A. (2014)¹³⁸ Krouse, S. and Vaishampayan, S. (2015)¹³⁹ UBS (2011)¹⁴⁰ Berthelsen, C. and Iosebachvili, I. (2014)¹⁴¹ Goldman Sachs (2014)¹⁴² Tracy, R. (2014)¹⁴³ Kolesnikova, M. (2014)¹⁴⁴ Tracy, R. (2014)¹⁴⁵ Slater, S. (2015)¹⁴⁶ Moore, M. and Dexheimer, E. (2015)

DECLINE IN SECURITIES LENDING ACTIVITIES

Securities lending plays a critical role in the capital markets and has been identified by the Bank of Canada as one of the five core funding markets¹⁴⁷. The uses of securities loans include the following:

- **Market-making:** In order to meet customer demand to buy and sell securities, market makers hold an inventory of securities and borrow securities as needed.
- **Short-selling:** Due to restrictions on “naked” short selling, institutions must borrow securities before entering into a short position on those securities. This is a critical function of securities lending, and contributes significantly to market liquidity.
- **Trade settlement:** Securities loans help institutions in covering settlement failures arising from operational issues.
- **Collateral upgrades:** Banks use securities loans to borrow high quality, liquid securities. The borrowed securities can then be used to raise cash in the repo market or as collateral for swaps and derivative transactions.

In addition, securities lending provides important benefits to buy-side investors, such as pension plans and mutual funds, by enabling the generation of low-risk, incremental returns on investment assets to enhance performance and offset costs. This can be particularly significant for public funds, which tend to have limited budgets and which face intense pressure to address structural funding shortfalls. As an example, a recent study of a large sample of US public pension funds shows that those funds with active securities lending programs generated average cumulative returns of 34 bps from this activity over an eight year period (2006–2013)¹⁴⁸.

The securities lending market is characterized by a number of risk controls. This includes the use of master securities lending agreements to specify each party’s legal rights and obligations, the overcollateralization of loans with cash or other high quality assets (with levels ranging from 101% for government bonds to 115% for equities and corporate bonds), the daily marking of positions to market, and daily adjustments in collateral in response to changes in market prices designed to ensure continued over-collateralization. The safeguards provided by the collateral mitigate the counterparty credit risk exposure, and therefore these transactions are generally regarded as low risk. Despite this relative safety, capital requirements have increased significantly for the indemnification of securities loans due to the application of the highly risk-insensitive haircut-based comprehensive approach¹⁴⁹, leading to an increase in costs. As a result, according to some market estimates, a decline of 30–50% in securities lending activities from already substantially diminished post crisis levels is expected.¹⁵⁰

Given the critical role of securities lending in the capital markets in generating liquidity, facilitating price discovery and ensuring trade settlement, this decline in lending volumes could result in a significant adverse impact on the liquidity and efficiency of financial markets.

SHIFT AWAY FROM THE REPO MARKET FOR FUNDING

Capital and liquidity regulations are likely to make it harder for banks to finance balance sheet expansion through repurchase agreements by increasing the capital requirements for collateralized financing and increasing the amount of stable (and, therefore more expensive) funding required. For example, the NSFR imposes a 10% funding

¹⁴⁷ Bank of Canada (2010); Other core funding markets include the market for treasury bills and bonds, the repo market, the market for bankers’ acceptances, and spot and swap foreign exchange markets

¹⁴⁸ Galper, J. (2015).

¹⁴⁹ See BCBS (2015k) for the comprehensive approach for the treatment of collateral.

¹⁵⁰ Ibid

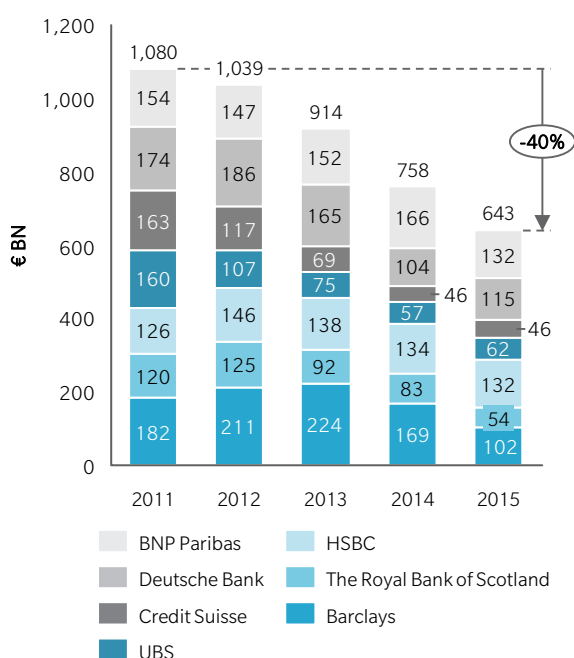
charge on reverse repos secured by Treasuries, thus making it costly for banks to provide financing despite the high quality of the collateral.¹⁵¹

This is supported by the Bank of England's report on Financial Stability¹⁵² which states that "reductions in repo activity have gathered pace in recent months, leading to wider bid-offer spreads and decreasing availability of repos." Thus, market participants may become less willing or able to borrow in repo markets, which would in turn have adverse implications for the efficiency and liquidity of financial markets. This would be further exacerbated in a severe stress scenario, where market participants may find it difficult to raise cash through the repo of securities other than for the highest quality collateral e.g. sovereign securities.

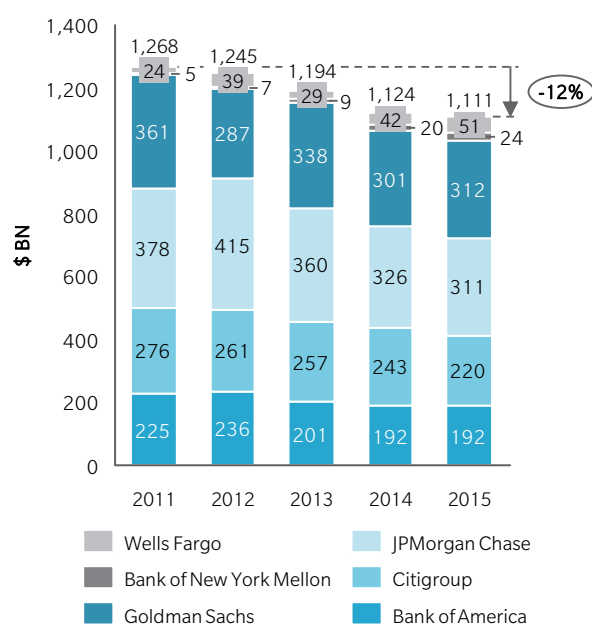
The significant contraction in repo volumes in the US and Europe are shown in Figure 5.10. Repo balances of European banks have declined by ~40% since 2011 and those of US banks have declined by ~12%.

FIGURE 5.10: REPO BALANCES HELD BY BANKS (BY REGION)

Repo balances of European banks



Repo balances of US banks



Notes: Chart uses 3Q15 data for Deutsche Bank and Credit Suisse; 2015 data updated by authors to include Barclays repo balances designated at fair value

Source: Company Data, Morgan Stanley Research (from Oliver Wyman and Morgan Stanley (2016)); Barclays PLC (2015)

Source: Company Data, Morgan Stanley Research (from Oliver Wyman and Morgan Stanley (2016))

Since the financial crisis, regulatory reforms have aimed to decrease the need for regulatory intervention by shifting the onus to banks to absorb the shocks associated with disruptions in the capital markets. However with heightened capital and stable funding requirements for collateralized financing faced by banks as a result of these reforms, the repo markets have not rebounded to their pre-crisis levels even with the Federal Reserve tapering its purchases. A possible explanation for this could be that the lower volumes in repo market are the new normal and

¹⁵¹ GFMA and IIF to the Federal Reserve System (2016)

¹⁵² Bank of England (2015b)

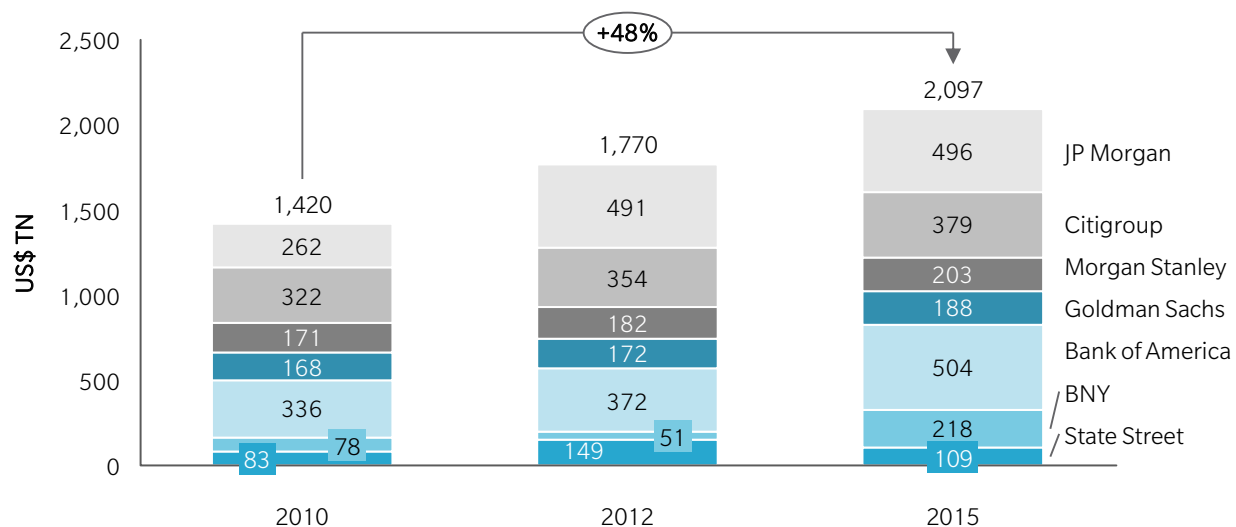
that repo funding has permanently become a less efficient form of financing. In fact, some market participants expect that volumes may decrease even further as the new liquidity rules take full effect.

Furthermore, the contraction observed in the repo market also raises the question whether in the event of another crisis, and in the absence of official sector intervention, the repo market will be able to sustain capital market shocks and continue to provide the required financing, particularly if a further reduction is observed in market liquidity.

INCREASED DEMAND FOR HIGH QUALITY LIQUID ASSETS

Regulatory requirements such as the Liquidity Coverage Ratio (LCR) stipulate the amount and quality of assets required to be held as liquidity reserves. As a result, banks will have to build reserves of High Quality Liquid Assets (HQLA) to comply with regulatory guidance for minimum levels of liquidity. Figure 5.11 shows the dramatic increase in HQLA holdings by major US banks in the last 5 years.

FIGURE 5.11: INCREASE IN HQLA HOLDINGS BY US GSIBS



Source: SEC filings

Further, mandatory clearing and margin requirements for non-centrally cleared derivatives will remove the high quality assets used for those requirements from circulation. The BCBS, in its QIS, estimated that the initial margin that would result from applying the regulatory proposal to derivative portfolios that would remain uncleared globally would be roughly €0.7 trillion¹⁵³.

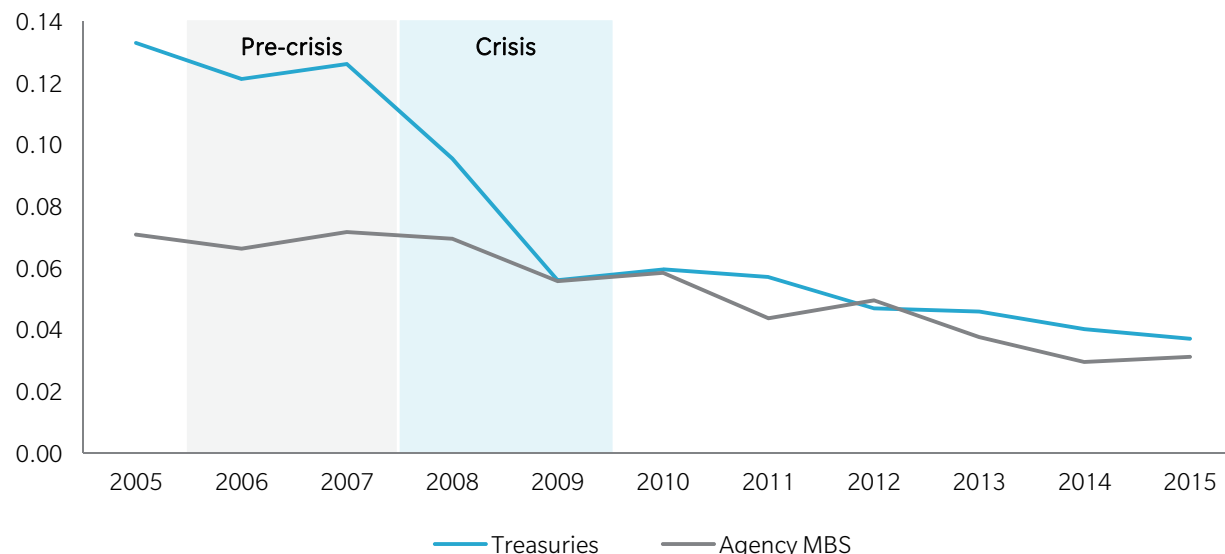
As a result of these regulations, circulation of HQLA in the market will decrease, leading to a corresponding decline in liquidity of these assets.¹⁵⁴ Since these assets are used as collateral for financing transactions, a decline in their liquidity will lead to further decline in repo market activity and activity in markets for collateralized instruments.

The reduction in circulation of HQLA poses a particular concern since markets have already observed a decline in turnover ratios for some assets. US Treasury and Agency MBS turnover ratios have declined since the financial crisis, as illustrated in Figure 5.12. Based on the experience of the recent crisis, turnover ratio could be expected to drop further in the event of a future stress environment.

¹⁵³ BCBS (2013k)

¹⁵⁴ GFMA, IIF and PwC (2015)

FIGURE 5.12: DAILY TURNOVER RATIO FOR US TREASURIES FROM 2005–2015



5.3. OFFSETTING FACTORS

While the overall impact of Basel regulatory reforms is expected to be a decline in the efficiency and liquidity of capital markets, a number of recent trends may partially mitigate this impact.

INCREASED ACTIVITY BY OTHER MARKET PLAYERS

An expansion of alternate providers of liquidity in capital markets may help compensate for the decrease in market making activity by larger regulated entities. Below are examples of such providers:

- **Smaller dealers:** In some jurisdictions, mid-sized and smaller dealers are not subject to the same regulatory constraints as larger dealers, providing them with a competitive advantage which they have used to expand market share. While this trend is expected to continue, they are unlikely to fully compensate for the reduction in activity from larger regulated entities due to limited balance sheet capacity, weaker credit ratings, higher funding costs, and the inability to provide a wide range of integrated services to customers.
- **Hedge funds:** As larger dealers withdraw from the market, hedge funds may step in to fill the liquidity gap partially. However, they have limited balance sheet capacity and may not be able to adequately replace the liquidity provided by banks, particularly for less-liquid assets. Further, hedge funds do not have the established client relationships that traditional dealers do, and therefore have less of an incentive to stay in the market and provide liquidity during periods of instability.
- **High frequency traders:** High frequency, automated trading has increased considerably in recent years and has, to some extent, offset reductions in liquidity provision by banks and larger dealers. However, these strategies are most suited to highly liquid instruments (e.g. on-the-run sovereign bonds). Further, there is some uncertainty regarding the role of these traders in creating or perpetuating significant market volatility and these firms will face increasing regulatory scrutiny in the future, as exemplified by MiFiD II provisions for high frequency trading activities.

As discussed above, it may be difficult for these providers to offer sufficient liquidity in the absence of traditional market makers, especially in periods of market stress. In particular, most alternate providers lack the scale, capital,

risk management infrastructure, global integration and multi-product client relationships to fully substitute for the reduced market making activity of larger banks.

GROWTH OF ELECTRONIC MARKETS

The “electronification” of markets can help improve liquidity by removing traditional barriers posed by geography, allowing multilateral interaction, and matching buyers and sellers more quickly. According to Oliver Wyman and Morgan Stanley (2015), market participants are currently pursuing four broad areas of focus:

- **Data and network:** Using technology and data to help dealers more efficiently link potential buyers and sellers, reducing the need for inventory to “rest” on dealer balance sheets.
- **Automated principal:** Accelerating the evolution of the existing client-dealer relationship towards electronic platforms, allowing automation of elements of price distribution, construction and risk management.
- **Agency trading:** Fundamentally changing the role of the dealer from one of market-maker offering committed pricing and liquidity in return for a spread, to one of a broker offering connection to a liquidity pool in return for a commission.
- **Pure buy-side to buy-side platforms:** Removing the role of the dealer as intermediary, and allowing clients to trade directly with each other (or potentially also dealers) through an electronic platform.

However, such trading platforms are best suited to standardized and highly liquid products and smaller size transactions for which a sufficiently large number of orders can be matched on a regular basis. Given the different structures of markets, penetration of electronic platforms varies widely. Table 5.3 provides an overview of the share of volume traded on electronic platforms for each asset class. While there is significant penetration across asset classes such as FX, listed futures, options and cash equities, penetration is low for interest rate swaps and corporate bonds. Further penetration of electronic platforms in the corporate bond market may be limited by the high heterogeneity and low liquidity of corporate bonds.

TABLE 5.3: SHARE OF GLOBAL VOLUME TRADED ON ELECTRONIC PLATFORMS, BY ASSET CLASS

ASSET CLASS	SHARE OF VOLUME TRADED ON ELECTRONIC PLATFORMS
Listed futures and options	>80%
Cash equities	50–70%
FX spots and forwards	>80%
Government bonds	50–60%
Interest rate swaps	20–30%
Corporate bonds	15–20%

Source: Oliver Wyman and Morgan Stanley (2015), Wholesale & Investment Banking Outlook.

5.4. IMPACT ON CAPITAL MARKETS

We expect the net impact of the changes in activities of regulated entities discussed in Section 5.2 to be a decline in the liquidity of capital markets and an increase in market volatility. While the existence of offsetting factors (discussed in Section 5.3) will mitigate this impact, they are unlikely to fully compensate for the decline in liquidity coming from banks and dealers subject to the Basel regulations. In addition there may be other impacts, such as client and product segmentation, and an evolution in execution and basis risks for end users.

The remainder of this sub-section discusses the impacts on market users to date, as well as some discussion of how this may change over time.

INCREASE IN TRANSACTION COSTS

A decrease in liquidity would result in an increase in transaction costs for investors. The impact is likely to be in the form of both direct and indirect costs.

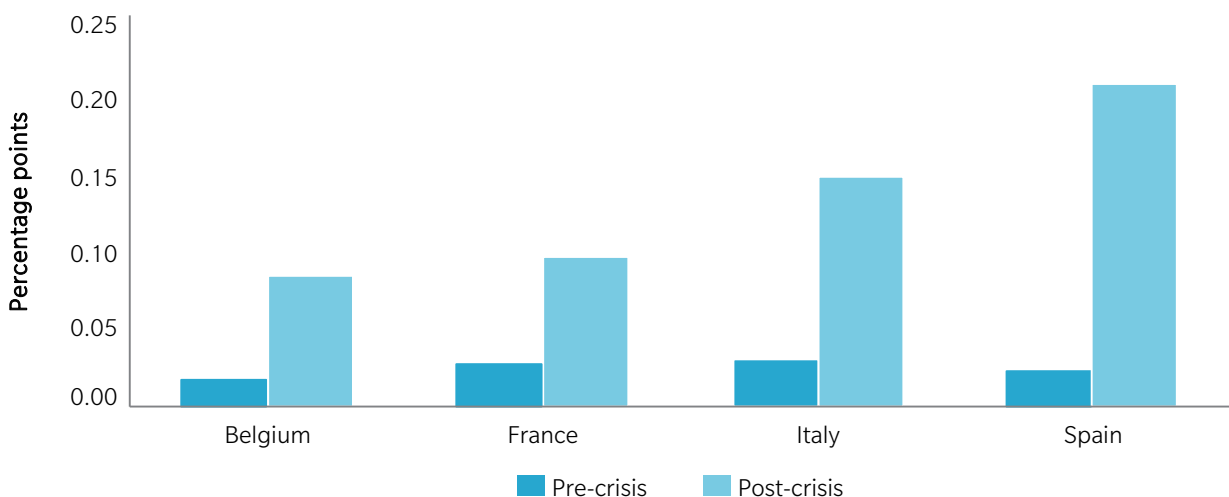
DIRECT COSTS

As discussed in Section 5.2, investors may face higher bid-ask spreads as banks widen spreads to offset the cost impact of increased regulatory requirements. Further, lower market liquidity itself can also result in wider bid-ask spreads since dealer inventories cannot be sold as quickly and efficiently resulting in greater risk of adverse asset price movements and therefore the need for higher spreads to protect from losses.

INDIRECT COSTS

In addition to an increase in direct transaction costs, decreased market liquidity would also result in adverse effects on market depth¹⁵⁵ and immediacy.¹⁵⁶ These in turn would increase indirect costs for market participants. In a market with lower liquidity, large transactions may significantly change prices in the direction of the trade (increase during a purchase and decrease during a sale) to the detriment of the participant initiating the transactions. For example, analysis performed by the IMF (2015b) shows that the price impact of a €100 MM purchase of five year on-the-run government bonds has increased significantly post-crisis across all countries studied (see Figure 5.13). While the European sovereign debt crisis almost certainly contributed to this increase, many market participants believe regulatory constraints were also a factor and may become more so.

FIGURE 5.13: PRICE IMPACT COEFFICIENT – 5 YR EUROPEAN SOVEREIGN BONDS (IN PERCENTAGE POINTS)



Notes: The figure shows the estimated price impact associated with €100 MM purchase of five-year on-the-run government bond for Belgium, France, Italy and Spain. Impacts are statistically significant at least at the 10 percent level with the exception of the pre-crisis impacts for Belgium, France, and Spain.

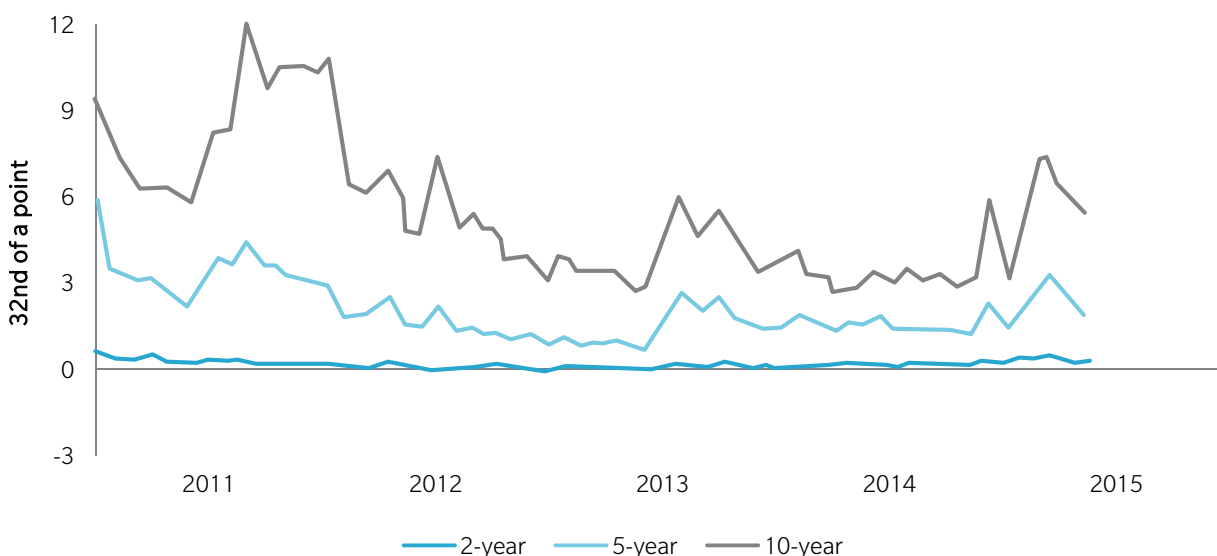
Source: Bloomberg, L.P., Markit, MTS, and Thomson Reuters Datastream data (from IMF (2015b))

Similarly, the price impact of large transactions in the US Treasuries market significantly increased in 2015 according to the CGFS (see Figure 5.14).

¹⁵⁵ High depth is characterized by large flows of trading flows on both the buy side and sell side

¹⁵⁶ High immediacy is characterized by low transaction times

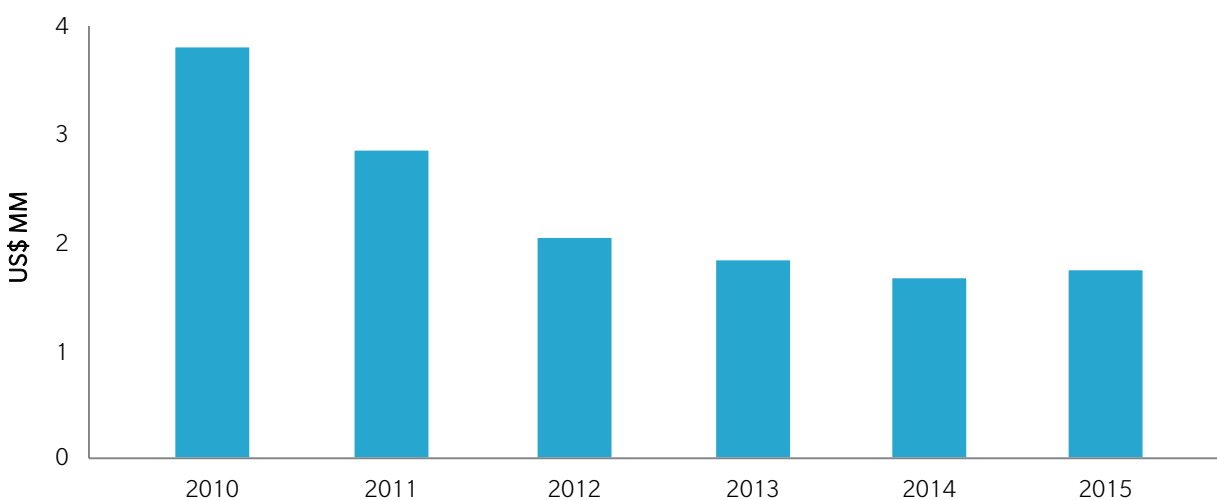
FIGURE 5.14: PRICE IMPACT – US TREASURIES



Notes: Price change per \$1 BN net order flow, monthly averages
Source: CGFS (2016)

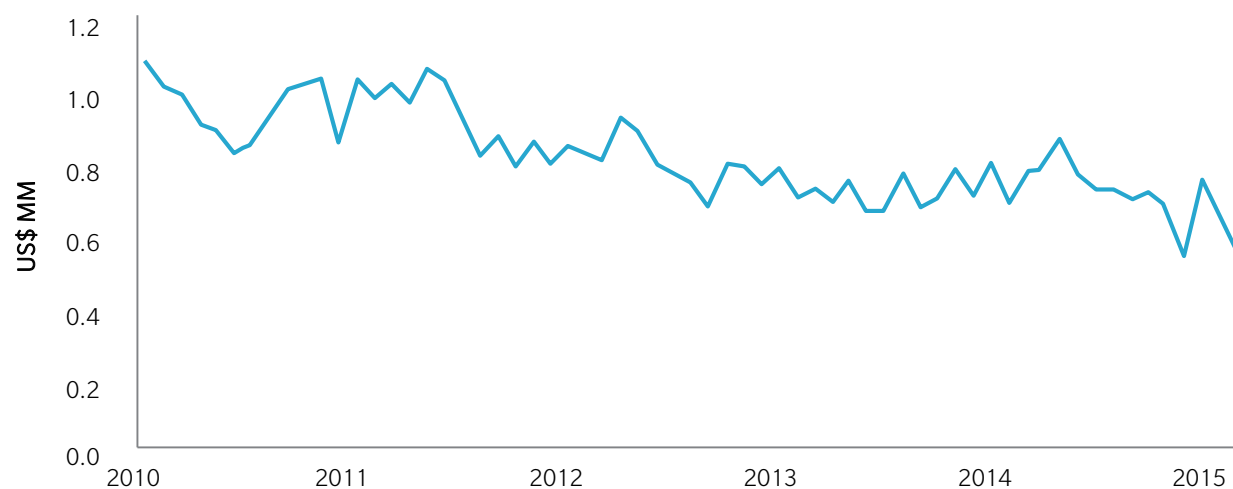
As a result of the price impact of large transactions, dealers may be forced to break up big transactions into multiple smaller transactions. There is evidence to show that this has occurred across a number of products. For example, Figure 5.15 and Figure 5.16 show that the average trade size in US Treasuries and European corporate bonds has decreased significantly since 2010. Declines in larger transactions (block-trades) in US corporate bonds from pre-crisis levels indicate a shift in trading patterns, with liquidity now associated with smaller trade sizes. A similar trend is also observed for equities, with a decline in transaction sizes in major stock markets (Figure 5.18). While the trend is clear, it should be noted that establishing causality is difficult due to the growth of other market participants such as high frequency traders whose business models are based on small and frequent trades.

FIGURE 5.15: AVERAGE TRADE SIZE IN US TREASURIES



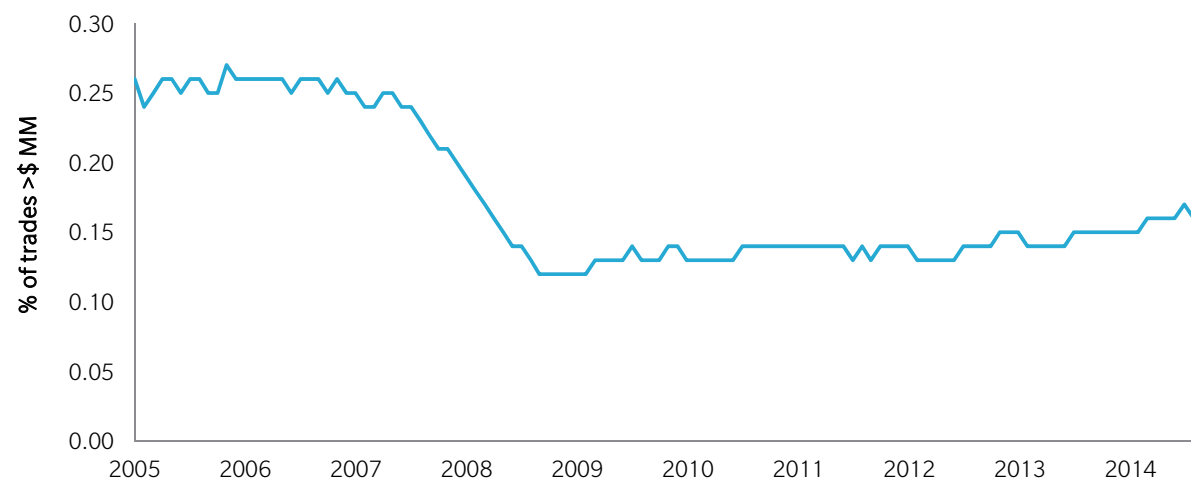
Source: Trax data (from GFMA, IIF and PWC (2015))

FIGURE 5.16: AVERAGE TRADE SIZE – EUROPEAN CORPORATE BONDS



Source: Trax data (from GFMA, IIF and PWC (2015))

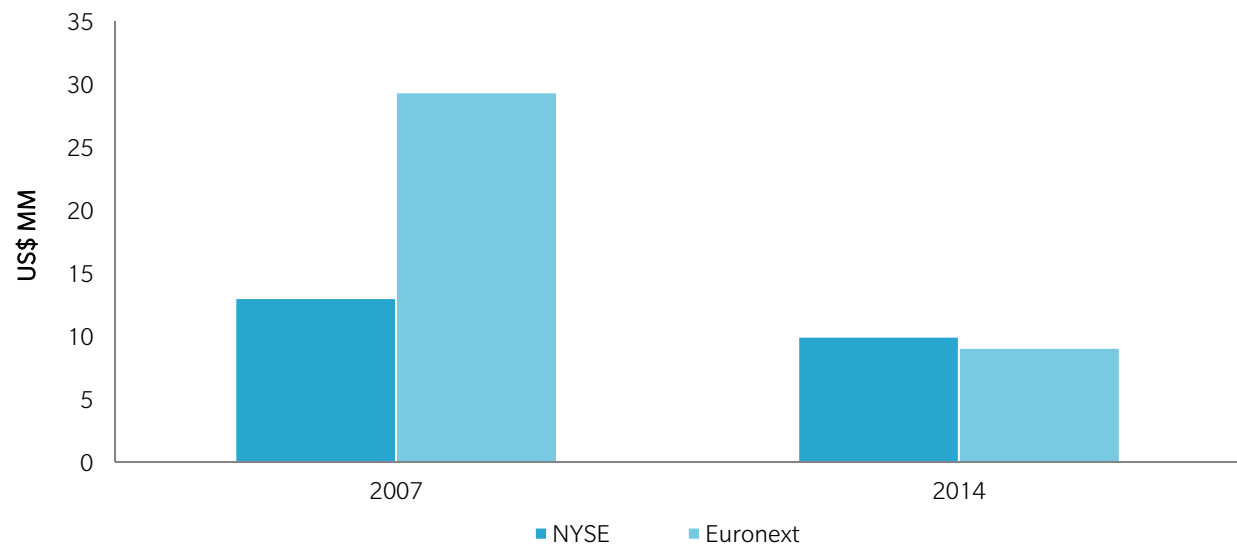
FIGURE 5.17: LARGE TRANSACTIONS IN THE US CORPORATE BOND MARKET (PERCENT)



Note: The figure shows the fraction of large trades in the US corporate bond market as a percent of total transactions. A large trade is defined as larger than \$1 million

Source: Bloomberg, L.P., Markit, MTS, and Thomson Reuters Datastream data (from IMF (2015b))

FIGURE 5.18: AVERAGE TRANSACTION SIZES FOR EQUITIES – NYSE AND EURONEXT (2004–2015)

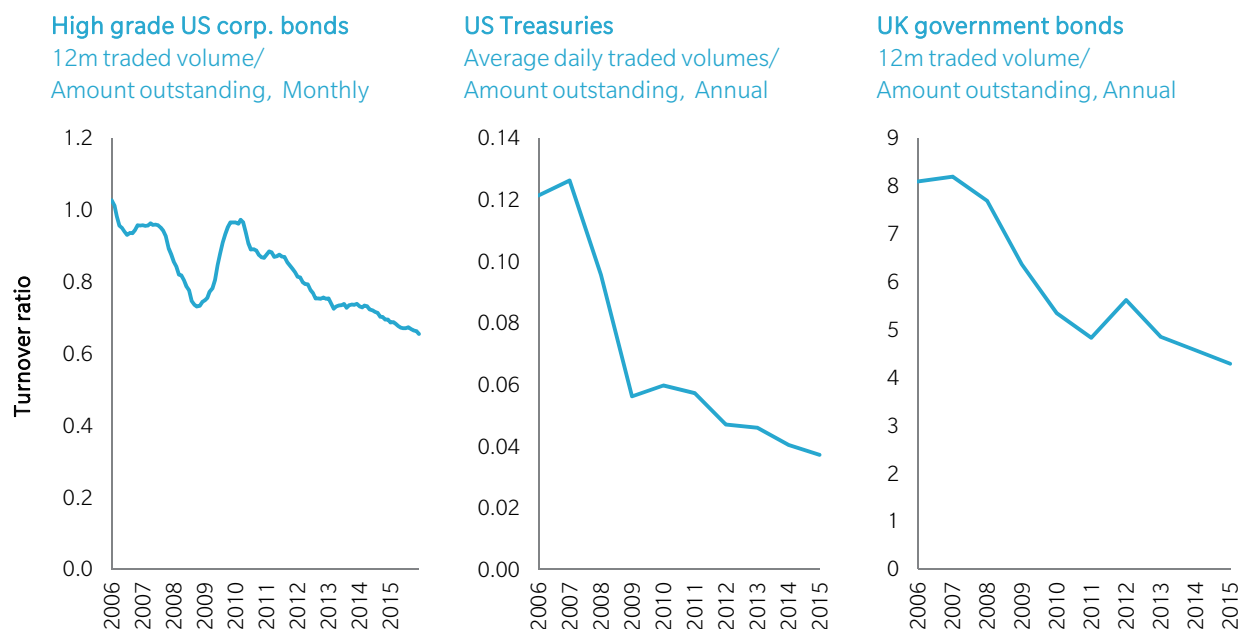


Source: WFE

A second source of indirect cost is the time required to sell a security. The longer a buyer/seller must wait to complete a transaction, the higher the risk that prices may move against them. The turnover ratio, defined as the ratio of transaction volumes to the total value of securities outstanding, provides one indirect measure of transaction times. Higher turnover ratios imply that a large number of buyers/sellers are available to transact at any given point in time. Across a number of financial markets, an increase in size due to issuance activity has not been matched by an increase in trading volumes, resulting in a decrease in turnover ratio as shown in Figure 5.19. As noted above, this decrease in transaction volumes may result in increased transaction costs. This trend is particularly evident for government securities and corporate bonds.

It should be noted, however, that turnover ratios can also be influenced by factors such as a change in the types of asset holders and consequently their average holding period for these assets. Since the turnover ratio combines the activities of long-term investors as well as short-term traders, understanding the implications of liquidity may warrant further analysis of turnover ratios specific to short-term traders.

FIGURE 5.19: TURNOVER RATIOS

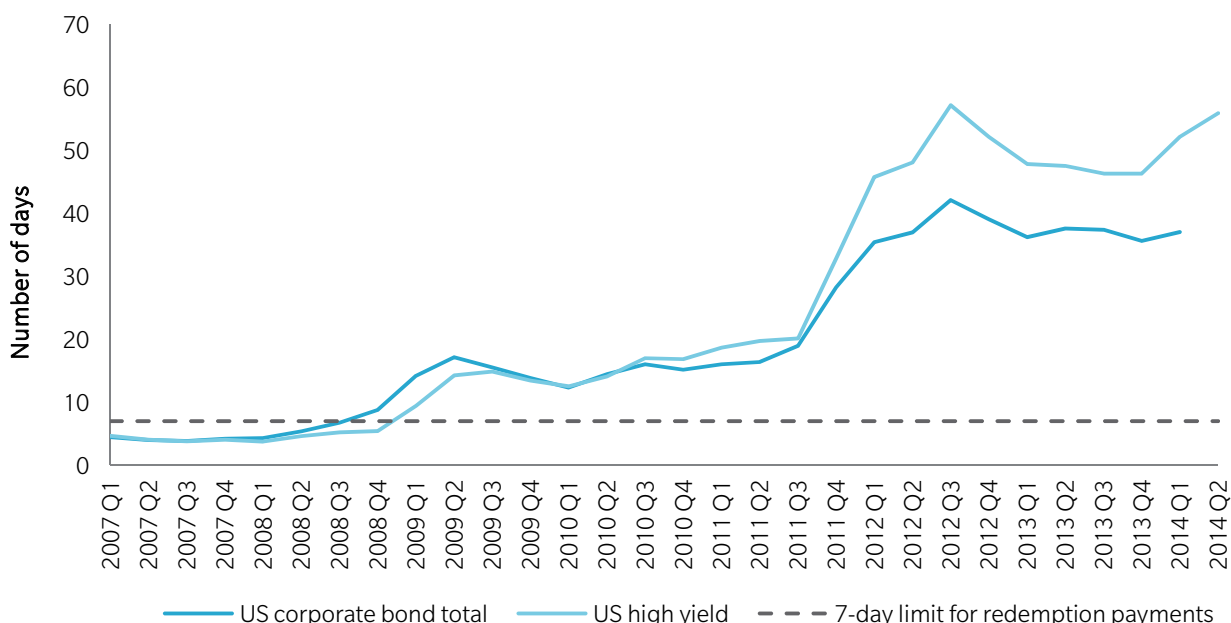


Source: MarketAxess, SIFMA, UK Debt Management Office

The decline in turnover ratio combined with the decrease in dealer inventories could result in liquidity mismatches with significant consequences for end users. For example, analysis performed by the IMF in 2014 shows that the number of days required for full liquidation of a US credit mutual fund has increased significantly since the pre-crisis period (see Figure 5.20)¹⁵⁷. It is estimated that 50–60 days would be required for liquidation of a high yield fund, compared to the 7 day limit for redemption payments.

¹⁵⁷ IMF (2014)

FIGURE 5.20: NUMBER OF DAYS FOR FULL LIQUIDATION OF US CREDIT MUTUAL FUNDS AND ETFS



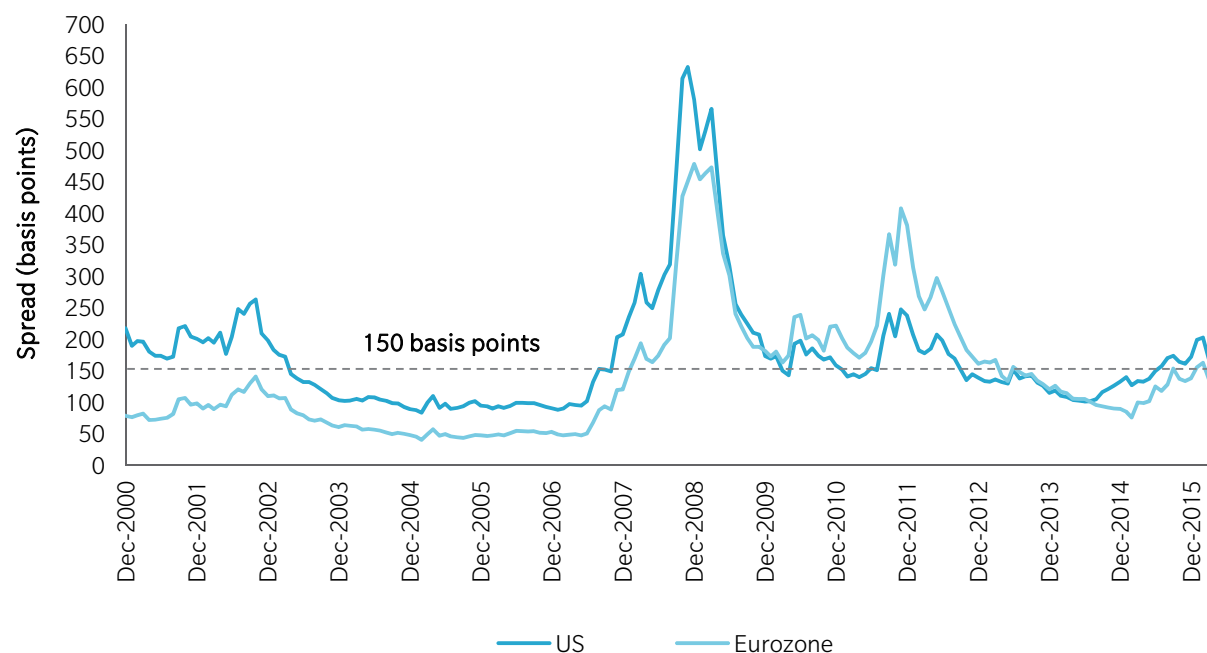
Note: The number of days to liquidate is the ratio of assets of mutual funds and ETFs (exchange-traded funds) per daily dealer inventories. Because there are no data for US high-yield bond dealer inventories before April 2013, the high yield line assumes a constant ratio of this amount to total corporate bonds before this date

Source: EPFR Global; Federal Reserve; and IMF calculations (from IMF (2014))

IMPACT ON SPREAD

As shown in Figure 5.21, spreads on investment grade corporate bonds in the US and the Eurozone have trended upward in recent years. Pre-crisis investment grade bond spreads in the US were close to 100 bps while in the Eurozone, they were around 50 bps. Although spreads witnessed a steady decline between 2011 and 2013, they increased considerably in 2014 and 2015, breaching the 150 bps level generally associated with an economic downturn. While there has been a dip in recent months, spreads remain significantly elevated above those observed in the pre-crisis period.

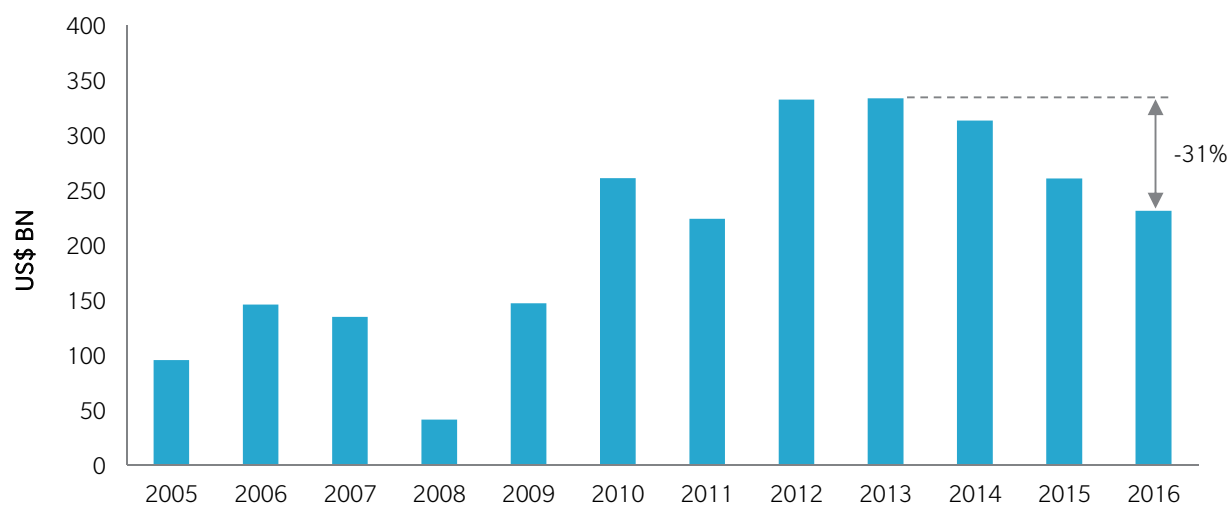
FIGURE 5.21: SPREADS ON INVESTMENT GRADE CORPORATE BONDS



Source: Barclays

An increase in bond spreads can have a significant impact on the ability of non-financial corporates to access capital. This is particularly important for high yield borrowers who rely on more volatile retail funding. As shown in Figure 5.22, US high yield issuance has dropped by 31% since 2013.

FIGURE 5.22: US HIGH YIELD CORPORATE BOND ISSUANCE

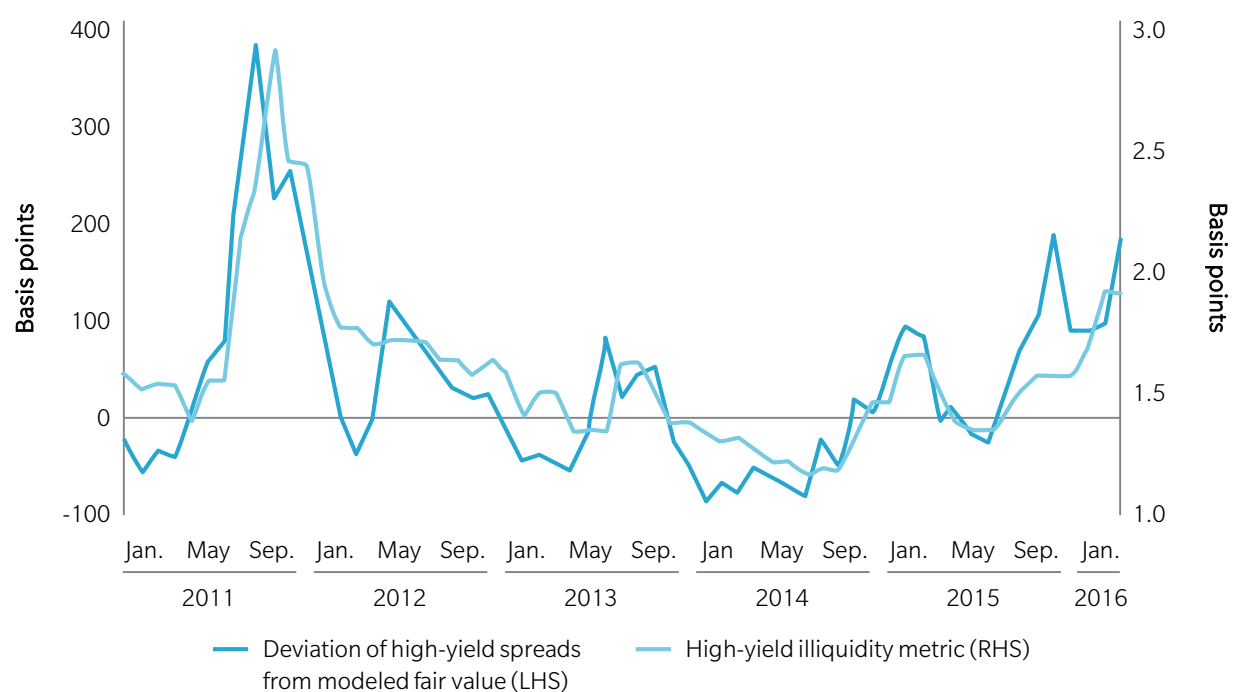


Note: 2016 figures are annualized based on data from January to May

Source: SIFMA

There is reason to believe that the widening of spreads in recent years is tied to deteriorating liquidity conditions in the market. The “credit spread” is the difference between corporate bond rates and government bond rates. It includes compensation for estimated credit losses, but also for liquidity risk and potentially other factors, including risk aversion. Given the absence of a significant deterioration in the macro-economic outlook or a meaningful increase in default rates, the widening of spreads is likely due to a decline in liquidity and a consequent increase in the “liquidity premium” demanded by investors. While it is difficult to estimate how much of the increase in spreads can be attributed to liquidity, this hypothesis is supported by analysis performed by the IMF¹⁵⁸ showing that observed high-yield spreads have deviated significantly from those predicted using a fair-value model (Figure 5.23). Further, the IMF analysis shows a high correlation between the deviation in spreads and market illiquidity¹⁵⁹ indicating that worsening liquidity conditions may have contributed to the widening of spreads beyond fundamentals.

FIGURE 5.23: DEVIATION OF US HIGH YIELD CORPORATE BOND SPREADS FROM FUNDAMENTALS



Note: High-yield illiquidity metric = Barclays Liquidity Cost Score

Source: Barclays data (from IMF (2016))

¹⁵⁸ IMF (2016)

¹⁵⁹ Represented by the Barclays Liquidity Cost Score

INCREASE IN MARKET VOLATILITY

The speed and extent of price movements in the capital markets is influenced by market liquidity. A large number of participants with an ability to transact quickly and efficiently can ensure that price movements not aligned with the market consensus are quickly nullified. Further, in a liquid market with a constant flow of transactions, large-block trades would have a limited impact on price, resulting in lower price volatility. There have been a number of recent incidences of extreme movement in prices that may indicate potential illiquidity in some markets. For example:

- In October 2014, following negative news on the US economy, 10-year US Treasury yields dropped by 37 bps, followed by a rebound to roughly the previous level, within a period of minutes. This represented a very large move by historical standards in that market in a very short space of time.
- In 2013, in response to news that the Fed might taper off its purchases of bonds in the markets more quickly than expected, there was a rapid decrease in the price of governments bonds, which then impacted prices of other bonds priced relative to government bonds.
- In 2015, when the Swiss National Bank gave up its policy of capping the Swiss Franc – Euro exchange rate, the value of the Swiss Franc jumped by 30% within the first 13 minute of trading before significantly reversing the move over the course of the day. Some market observers believe that the extent of price movement would have been more subdued in a more liquid market.
- European sovereign bond prices fluctuated dramatically in the first half of 2015. For instance, German 10-yr government bond prices moved by 7–8% from peak to trough.¹⁶⁰
- In 2015, rates in US\$ interest rate swaps dropped suddenly below corresponding Treasury yields, for the first time in more than 5 years.
- In February 2016, Portuguese sovereign debt experienced a dramatic increase in yield to over 4.5%, the highest since Portugal's bailout exit in May 2014, despite stable economic fundamentals.

These incidents may have been less extreme in the presence of greater market liquidity. Further, there are concerns that these incidents are indicators of an increased frequency of extreme episodes of volatility rather than simply one-off events.¹⁶¹ But, given the existence of multiple competing drivers, it is difficult to ascertain the extent to which these incidents were caused by a lack of market liquidity driven by changes in regulation.

¹⁶⁰ Elliott (2015)

¹⁶¹ Ibid.

5.5. POTENTIAL FUTURE IMPACTS ON MARKET LIQUIDITY AND MARKET STRUCTURE

Going forward, we see a substantial risk of a further deterioration in market liquidity for the following reasons:

- Finalization and full implementation of regulations such as NSFR, Leverage Ratio, margin requirements and FRTB will result in increased regulatory costs for banks and large dealers, forcing them to exit businesses or pass on costs to end users.
- Monetary policy has supported market liquidity in a number of regions. But, central banks are expected to gradually tighten monetary policy going forward, potentially exposing liquidity issues that were previously masked by accommodative policies.
- Banks will refine internal pricing and capital allocation mechanisms for capital and liquidity, more effectively passing on the true cost of regulation onto the appropriate business units, and thereby onto end users.
- Re-pricing of products will gradually gather steam as banks make efforts to improve return on equity.

It is also likely that there will be a non-linear increase in effects, as banks and dealers tend to make the easiest adjustments and those that hurt customers least before they move on to more painful moves. In addition, market structures will continue to evolve with an increase in electronic trading and changes in bank business models and these shifts will likely become more permanent.

Given these considerations, analysis of the impact on capital market functioning should continue to be a high priority for regulators in the design, calibration and implementation of regulations. In order to have a holistic and accurate view, the interaction with evolving markets rules (such as MIFID II in Europe for instance) should also be taken into account. Finally, regulators should also aim to develop measures to smooth the path to the “new normal” in financial markets, and ensure that implementation timelines for new regulations are suited to the adoption of these measures.

6. OVERALL COHERENCE AND POTENTIAL ISSUES WITH BASEL REFORMS

In analyzing the impact of post-crisis Basel reforms, it is important to understand the cumulative impact and interaction of regulations in order to achieve the optimal design and calibration for a financial system that promotes stability and works to support economic growth.¹⁶² There is consensus that changes in the regulatory requirements were needed and the capital ratios (especially the higher quality CET1) were too low prior to the crisis. However, a number of concerns have been raised by academics and market participants about the calibration and implementation of the reforms.

TABLE 6.1: POTENTIAL ISSUES WITH REGULATORY REQUIREMENTS

POTENTIAL ISSUES	BRIEF DESCRIPTION
Inconsistent sets of rules	- Two or more rules may pull in different directions - Potential to increase the total economic cost without a corresponding benefit in terms of safety and soundness
Mis-calibrated rules	- Many of the rules involve decisions about minimum thresholds or other quantitative criteria - It is possible for the chosen level of reforms to produce too great a cost for the desired benefits - One-size-fits-all definition of thresholds may not allow appropriate consideration of divergent regional financing structures, legal protections and bank balance sheet compositions
Duplication or interaction of coverage	- Rules may be appropriate taken individually, but their interaction results in an undue regulatory burden on certain products or on the system as a whole - These rules drive bank behavior that may create substantial problems for particular activities, services, and products that are important to customers and functioning of the wider market, even if the calibration of overall capital or liquidity levels for the banking system as a whole is broadly appropriate
Unintended consequences	Reforms may create other unintended consequences for the broader economy, such as the potential for concentration of exposures in parts of the financial sector that are not regulated or regulated only lightly (often referred to as “shadow banks”) or some of the changes in the market structure and the way market participants interact

As outlined in Table 6.1: Potential issues with regulatory requirements, there are four types of potential issues with the Basel reforms: 1) potential inconsistency in rules; 2) potential mis-calibration of rules; 3) potential duplication or interaction of rules; and 4) potential unintended consequences of rules. Although some of these problems could arise in regard to a single rule taken by itself, many of the tougher challenges arise from the combined effects of multiple rules. Table 6.2: Interaction of regulatory requirements below highlights the different ways in which rules can interact.

¹⁶² GFMA, IIF and PwC (2015)

TABLE 6.2: INTERACTION OF REGULATORY REQUIREMENTS

INTERACTIVE EFFECTS	BRIEF DESCRIPTION AND EXAMPLES
Additive	- Combined effect is assumed to be the simple addition of the impacts of the individual reforms. This is generally chosen because it is an easy and seemingly neutral assumption - In some limiting cases, an additive impact may take the form of the following: - Prohibiting. In some cases, two or more regulations may be additive in their effects until a threshold is crossed where some activities cease to be competitive for the bank to conduct - For example, if the combined effects of higher capital and liquidity requirements on banks make it sufficiently cheaper to operate as a non-bank, then activities will migrate over time towards shadow banking. Smaller scale changes to capital and liquidity might have no such effect, because the competitive advantages of being a bank might still outweigh the drag of more expensive funding - Distributional. A less severe version of “prohibiting” regulations are the ones that shift the relative attractiveness of different types of business. In the first instance, two regulations might be additive in their impacts. However, taken together, they may create incentives for a substantial shift of business from one activity to another, changing the overall impact on the bank in multiple ways
Offsetting	- In some cases, one regulation partially offsets the cost of another - For example, the aggregate cost of meeting the LCR and NSFR requirements should be less than the sum of the two individual rules. Specifically, moving from short-term funding to debt with a maturity of over one year would help meet both requirements, so the cost should not be double-counted
Alternatively binding	- Two regulations may aim at the same broad goal and be binding in different circumstances - For example, both the leverage ratio and the risk-weighted capital requirements are aimed at ensuring sufficient total capital - A bank might find that the requirements under the leverage ratio are initially considerably below the capital levels needed under the risk-weighted approach - Thus, a small increase in the leverage ratio would have no impact on total capital requirements. But, a sufficiently large rise would turn the leverage ratio into the binding constraint (at the bank or even business line level), such that each additional increase in that ratio would add to total capital needs
Multiplicative	- The requirements of one regulation may make it even more expensive to meet the requirements of another - For example, the leverage ratio can make it expensive to hold short-term high quality securities, potentially making it more difficult and costly to meet the LCR by increasing holdings of HQLA, yet other ways of meeting the LCR requirement may be more expensive. The combined effect could be greater than the two individual effects, depending on market conditions

SUMMARY OF POTENTIAL ISSUES

Research to date has addressed these potential issues through a combination of empirical analysis and theoretical research. In particular, the potential issue of mis-calibration has received the most attention from academic and official literature: studies such as Basel Committee’s Long-term Economic Impact (hereafter “the LEI study”),¹⁶³ ECB (2015), Miles, Yang, and Marcheggiano (2012), Begenau (2015), Nguyen (2014), Kato (2010), and others evaluated the calibration of some key reforms.¹⁶⁴ However, given the recent nature of many of these reforms and the fact that not all have been fully implemented to date, there frequently is little opportunity to develop a quantified approach to issues such as inconsistency, implementation difficulties, and duplication of regulation.

¹⁶³ Cited in the bibliography as BCBS (2010a)

¹⁶⁴ BCBS (2010a), ECB (2015), Miles, Yang, and Marcheggiano (2012), Begenau (2015), Nguyen (2014)

Thus, a number of trade associations,¹⁶⁵ as well as individual firms, have submitted comments on a variety of regulations, focusing on conceptual and practical issues, though some academic non-empirical research also discusses potential issues with reforms. These comments address a number of potential issues with Basel reforms and with their national implementations.

The table below summarizes the issues discussed in this section, at a high level. These are some of the key issues the authors identified during their research and literature review, but are not intended to be an exhaustive list. The authors have not formed their own judgments on the severity of these issues, but do believe that they should be considered by regulatory bodies examining the interaction, coherence, and overall calibration of reforms. Some of these issues are discussed in or quantified in earlier sections.

TABLE 6.3: SUMMARY OF POTENTIAL ISSUES WITH BASEL REFORMS

TYPE OF POTENTIAL ISSUE	POTENTIAL ISSUE	DESCRIPTION
Consistency	Conflicting incentives of the leverage ratio versus other capital and liquidity ratios	Risk-insensitive leverage ratio produces divergent incentives for the composition of a bank's portfolio from the incentives produced by risk-sensitive capital requirements
	Inconsistency of incentives created by structural and liquidity reforms	Segregation of businesses due to structural reform could impact consolidated entity's stable funding, and could be creating conflicting incentives for banks
Mis-calibration	Calibration of capital ratios	Limited consensus on optimal levels, especially in light of expected RWA increases from current workstreams, at both a consolidated and granular (activity) levels
	Calibration of TLAC	The impact of TLAC requirements including internal TLAC arrangements should be assessed further to ensure appropriate calibration in the context of the cumulative impact of TLAC, capital requirements, and expected RWA increases from current workstreams
	Calibration of the leverage ratio	The LR could be the binding constraint for a large share of banks, potentially going beyond the intention of many that it be a backstop; calibration needs also to be assessed at the activity level and how it may impact strategic decisions, as, for example, the LR may be the binding constraints for fully collateralized trades and market making on government bonds
	Calibration of LCR	Assets included in and excluded from HQLA definition may be mis-calibrated based on underlying risk
	Calibration of sovereign debt weights	Standardized zero risk weight for sovereign debt underestimates underlying risk in varying degrees
	Calibration of mortgage weights	Mortgage risk weights could be misaligned with underlying risk factors
	Calibration of credit conversion factors (CCF)	Calibration of CCF for certain exposures (e.g. off-balance sheet exposures, trade finance, infrastructure) could be too punitive compared to historical experience
	Calibration of Standardized Approach leading to reduction in risk sensitivity	Calibration of proposed SA measures reduces risk sensitivity for some asset classes and may create distorting incentives; may also, in combination with capital floors, duplicate the "backstop" role of the leverage ratio
	Calibration of NSFR	NSFR requirements may impose unnecessarily high costs on certain derivative trades and linked transactions

¹⁶⁵ We reviewed comments submitted by the following associations in writing up this report: Global Financial Markets Association (GFMA), Securities Industry and Financial Markets Association (SIFMA), Asia Securities Industry and Financial Markets Association (ASIFMA), Association for Financial Markets in Europe (AFME), Institute of International Finance (IIF), and The Clearing House (TCH). Comments from other organizations were reviewed at times as well.

TYPE OF POTENTIAL ISSUE	POTENTIAL ISSUE	DESCRIPTION
Duplication or interaction of coverage	NSFR, LCR, and US G-SIB buffer (addressing maturing mismatch and short-term wholesale funding)	US G-SIB buffer, and potentially the inclusion of G-SIB in CCAR addresses liquidity and funding issues already addressed by NSFR and LCR
	Capital floors	Capital floors may duplicate “backstop” role of the leverage ratio and are not consistent with robust qualification test for internal models
	Step-in risk	Proposed regulation for step-in risk could be duplicative of other measures that have already addressed the underlying issue, e.g. prohibition of sponsor support for money market funds
	CET1 ratio, leverage ratio, and stress testing	CET1 ratio, leverage ratio, and stress testing may each be a binding constraint depending on the year, which may create complexity in banks’ determination of their binding constraint and cause inconsistency in internal capital allocation and internal transfer pricing mechanisms within banks
Unintended consequences	Shadow banking	Regulatory reforms could push an increasing amount of financial activity to a less regulated “shadow banking” sector, thus potentially increasing systemic risk
	Procyclicality	Countercyclical capital buffer may not sufficiently address cyclicity and could potentially be procyclical in practice
	Leverage ratio incentives for deposits (held at central banks)	Leverage ratio creates a disincentive for custody (and other) banks to accept cash deposits, especially during a “flight to safety” in a crisis; leverage ratio may also create other disincentives for products or activities, such as OTC clearing
	Impacts of liquidity reforms on overall market liquidity	While liquidity reforms improve liquidity at the individual bank level, they may lead to a decline of overall market liquidity
	Impacts on market structure	Reforms create incentives for alterations to market structure, such as market or client exits, possibly limiting provision of financial services
	HQLA Alternative liquidity approaches (ALA)	Low supply in government debt in some geographies has led to ALAs that are not fully linked to central bank liquidity policies, which may reduce central bank ability to respond to a crisis
	Distributional consequences	Reforms will impact some products or services more than others and may consequently impact end-users in ways that were not intended. For example, corporate customers and SMEs will be more impacted by lending rate increases, primarily due to capital weight differentials

The rest of this section provides a conceptual overview of the types of issues with Basel reforms and provide examples of how these issues could materialize.

6.1. POTENTIALLY INCONSISTENT SETS OF RULES

In a similar manner to most regulatory bodies, the Basel Committee rules are developed by specialized working groups that report to the Policy Development Group within the Basel Committee.¹⁶⁶ These specialized working groups are made up of subject matter experts who are focused on specific policy issues such as the trading book, securitization, the leverage ratio, etc. As a result, reforms are initially developed by distinct bodies, although teams do communicate across the groups. This separation of the development of reforms can create a potential for inconsistencies between rules or the incentives that they create, despite the Basel Committee's best efforts to smooth out inconsistencies before rules are finalized. National and regional regulatory reform efforts face similar risks of "silo" effects, especially when working under time pressure.

Inconsistencies among rules may increase the total economic cost of achieving the desired financial sector stability or, in the extreme, actually reduce the stability of financial markets despite increasing costs.

Potential for inconsistencies are discussed further below. It should be emphasized that quantitative impact studies should also be done at a granular level paying attention to the internal capital allocation processes and practices in banks.

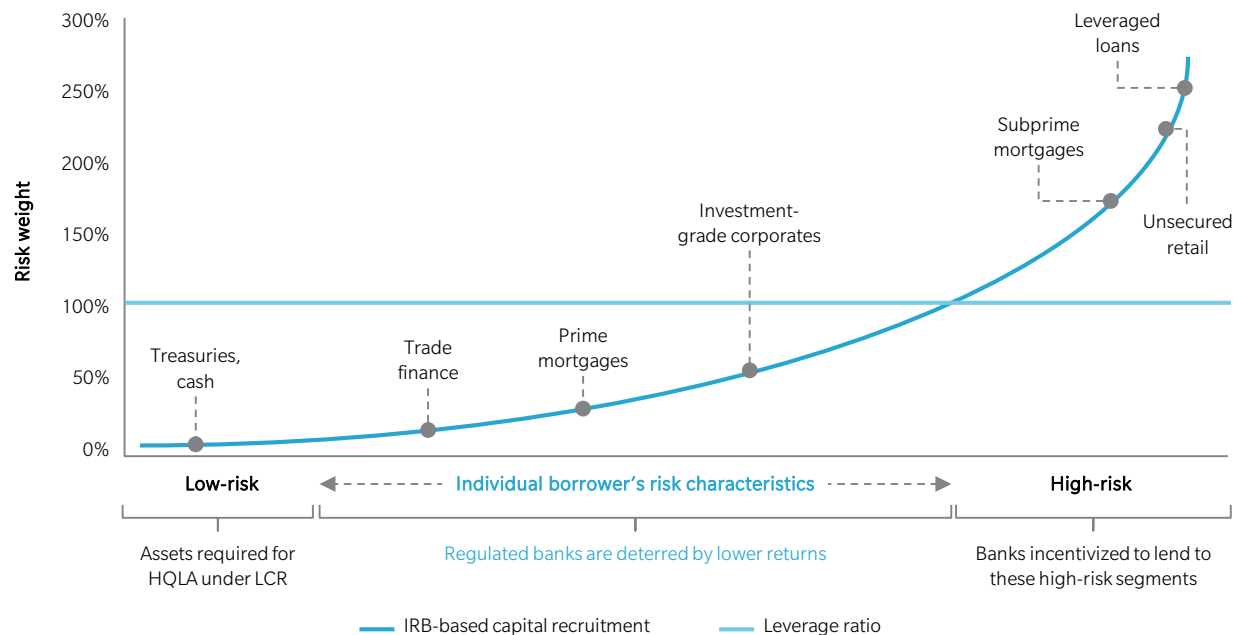
6.1.1. CONFLICTING INCENTIVES OF THE LEVERAGE RATIO VERSUS OTHER CAPITAL AND LIQUIDITY RATIOS

One example of this is the potentially inconsistent incentives created by the risk sensitive capital ratios (such as CET1/RWA), liquidity reforms, and the leverage ratio. Since the leverage ratio does not make a distinction between different types of bank assets based on their underlying risk, it implicitly encourages banks to hold relatively riskier assets and could penalize banks with large portfolios of low yielding and comparatively liquid assets like cash. On the other hand, risk sensitive capital ratios and liquidity reforms pull banks in the opposite direction. Risk weightings and liquidity requirements drive banks to build up assets with a lower risk weight and higher liquidity, such as those designated as high quality liquid assets.

Risk weighting and liquidity reforms effectively incentivize banks to lower the RWA denominator of the equity to risk assets ratio, while the leverage ratio incentivizes banks to increase it. This can either be viewed as a careful balancing act or as the creation of inconsistencies that reduce the effectiveness of the reforms, depending on the details of the implementation and one's viewpoint. Practically, the conflicting incentives can lead banks to "barbell" their balance sheets by holding higher risk/higher yielding assets to balance out the capital charge from the large amount of lower risk/lower yielding assets required by the LCR, as illustrated in the figure below, taken from IIF (2016).

¹⁶⁶ BIS (2016b)

FIGURE 6.1: “BARBELL” EFFECT BY TYPES OF ASSETS



Source: IIF(2016)

This issue of conflicting incentives is exacerbated by the fact the binding ratio may shift over time between either the risk-sensitive capital ratio or the leverage ratio (or potentially national stress tests). This issue and other concerns related to the leverage ratio are discussed further in this section.¹⁶⁷

6.1.2. INCONSISTENCY OF INCENTIVES CREATED BY STRUCTURAL AND LIQUIDITY REFORMS

There are concerns that proposed and instituted structural reforms could impact stable funding, particularly in the UK Market participants argue that if banks were required to segregate or “ring fence” the part of their business with a stable retail deposit base away from other business lines, this would impact the consolidated entity’s stable funding. Additionally, segregation of certain business lines would require institutional banking operations to be funded from long-term wholesale debt to be compliant with LCR/NSFR. The lack of consistency in incentives presented by LCR/NSFR and structural reforms could add pressure for banks to increase their holdings of liquid assets. As this issue deals primarily with jurisdictional implementation of reforms, it is not discussed further in this report.¹⁶⁸

6.2. POTENTIALLY MIS-CALIBRATED RULES

Many of the rules involve decisions about minimum thresholds or other quantitative criteria where it is possible for the chosen level to produce too great a cost for the desired benefits. Misalignment of economic risks and regulatory measures could result in end users paying the costs of reforms without receiving commensurate benefits. Significant work has been done on evaluating the optimal calibration of capital ratios, though other reforms such as NSFR and LCR have received less attention, and there is still considerable uncertainty about the calibration of the ongoing Basel workstreams and their effect on capital requirements.

¹⁶⁷ Avgouleas (2015), AFME (2016), European Commission (2016) – based on summary of comments

¹⁶⁸ AFME and PwC (2014c)

OVERALL CALIBRATION OF REFORMS

Overall calibration of reforms has been subject to much debate, given the underlying tradeoffs between stability (e.g. bank default rates) and potentially slower economic growth. Additionally, overall calibration of reforms has been urged for re-consideration by some observers, as joint effects of reforms may go beyond the intended benefits.

6.2.1. CALIBRATION OF CAPITAL RATIOS

The overall level of capital requirements has been one of the key concerns with calibration of reforms. The increased regulatory burden impacts banks' funding costs, which may be passed on to the end users in the form of either higher loan rates or decreased loan volume in the lending market, and potentially increased transaction costs in capital markets.¹⁶⁹ The calibration must then balance these costs against the benefits that these reforms create for society. As noted, numerous studies have focused on understanding the optimal level of capital.¹⁷⁰

Research to date has shown a wide range of results about the optimal calibration of capital reforms, leaving the correct answer unclear. Differences in methodology and underlying assumptions have resulted in estimated optimal levels that range from 8% to over 20% of RWA. As an example of the lower end of calibration, Nguyen (2014) calibrated a model that indicated the optimal capital requirement to be 8% of Tier 1 capital over RWA, while Begenau (2015) identified 14% CET1 as the optimal capital requirement. Researchers from the Federal Reserve Bank of New York found that the buffer adopted by the Basel Committee is "generally consistent with the actual losses experienced by large banks during the recent and past financial crises" and is therefore calibrated for crisis losses.¹⁷¹ On the other hand, in its 2010 study of the long-term economic impact of stronger capital and liquidity requirements,¹⁷² the BCBS found that there are significant positive benefits to increased capital ratios, outweighing the costs, in their view. The study in fact concluded that the capital ratios were too low and opportunity remained to increase capital while generating positive benefits. Some academic and official studies have also argued for increases in bank capital levels (e.g. Miles, Yang and Marcheggiano (2012) and Admati and Hellwig (2013)).¹⁷³ Using a dataset of almost 200 years from a number of countries, Miles, Yang and Marcheggiano (2012) found an optimal calibration of bank capital to be around 16–20% Tier 1 capital over RWA based on the then prevailing definitions (this is important as changes to RWA definition impact the capital ratio). Finally, Dagher et al (2016) find that capital requirements of 15–23% of RWA would have been sufficient to "absorb losses in the majority of past banking crises."¹⁷⁴ The majority of the studies examined capital levels without differentiating between CET1 and other forms of capital. Thus it may be most appropriate to compare the levels with TLAC rather than just equity capital. Ranges of optimal calibration are shown in the figure below.

¹⁶⁹ Elliott, Salloy, and Santos (2012)

¹⁷⁰ BCBS (2010a), ECB (2015), Barrel et al (2009), Begenau (2015), Nguyen (2014)

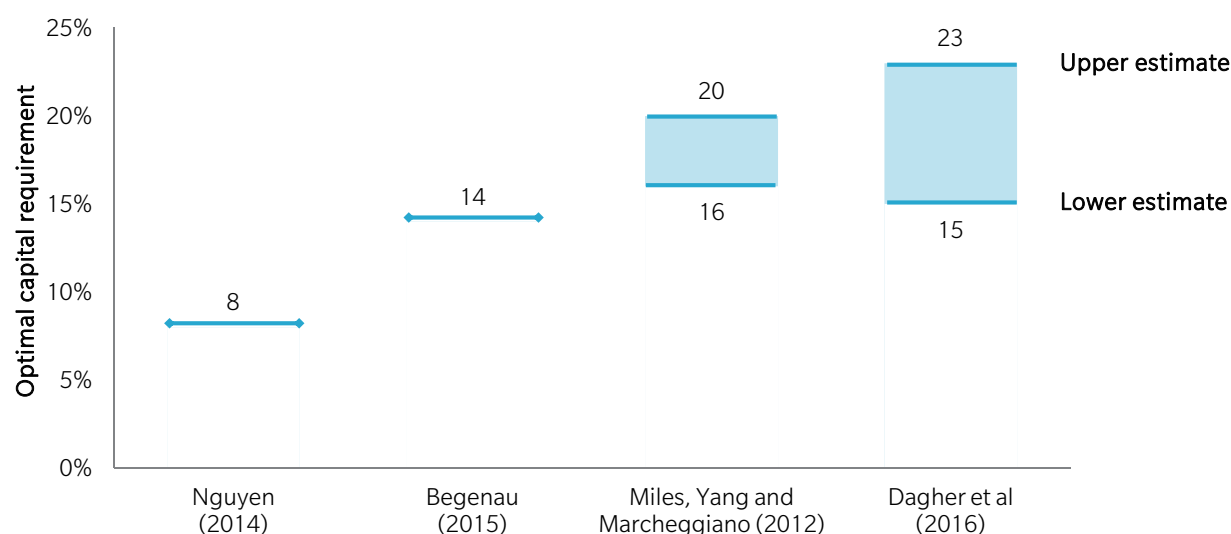
¹⁷¹ Hirtle (2011)

¹⁷² BCBS (2010a)

¹⁷³ Admati et al (2013), Miles, Yang and Marcheggiano (2012)

¹⁷⁴ BCBS (2010a), ECB (2015), Barrel et al (2009), Miles, Yang and Marcheggiano (2012), Begenau (2015), Nguyen (2014), Hirtle (2011), Dagher et al (2016)

FIGURE 6.2: ESTIMATES OF OPTIMAL CALIBRATION OF CAPITAL REQUIREMENTS



Some studies note that the optimal level may vary across and within banks. Analysis by Clerc et al. (2014) implied that the optimal steady-state regulatory capital ratios are different for different types of exposures: about 10% for business loan exposures, and about 5% for real estate exposures. Further, Kato (2010) found that the optimal level of bank capital would vary considerably “depending on the level of liquidity indicators both on the asset and liability sides of banks’ balance sheets as well as macroeconomic conditions, typically represented by housing market inflation.”¹⁷⁵

As evidenced by the wide range of optimum capital levels in the literature, the overall calibration of Basel capital reforms will continue to be an open question. ECB (2015) therefore argues that “it will be appropriate for [governing bodies] to continually review the calibration of post-crisis regulations in order to maintain regulatory calibrations at levels that maximize net benefits to society. Such reviews should be holistic in scope – ensuring that the interactions between different strands of the regulatory architecture are captured.”¹⁷⁶

The majority of these analyses have been conducted at a macro (or consolidated bank) level, while the specific impacts on an asset class, a product or a business line need to be assessed at a granular level in order to understand the impact on the real economy according to the specific prevailing economic conditions of each region or country. For example, the impact on mortgage lending may be quite different depending whether exposures are generally held on banks’ balance sheets or not. Similarly, the impact of export finance capital requirement increases will be more detrimental to open economies.

The potential need for review of the overall calibration of capital reforms is further highlighted by the layering of other regulations which themselves have been subject to concerns about calibration.

First, the final calibration of the current workstreams of Basel reforms (limitations on use of internal models, capital floors, risk weights, etc.) is still forthcoming. However, as discussed earlier, some market participants have pointed to the fact that these reforms are expected to increase RWAs, sometimes referred to as “RWA inflation”. As discussed in Section 1, revisions to the SA for credit risk, and operational risk calculations, FRTB, and limitations on use of internal models, combined with capital floors, could create aggregate RWA inflation with a lower bound of ~10–30%, with a commensurate increase in capital requirements.¹⁷⁷ As noted, however, the GHOS of the Basel

¹⁷⁵ Kato, Kobayashi and Saita (2010), Clerc et al (2014)

¹⁷⁶ ECB (2015)

¹⁷⁷ Dawn (2015), Durand (2015), Keenan and Spick (2015), KPMG (2015), Macquarie Equities Research (2016), The Economist (2015), Turner (2012)

Committee have issued assurances that the total increase in RWA will not be “significant” in the aggregate for the industry, which most observers interpret to mean a ceiling of 10% or perhaps lower. If this carries through in practice, then the calibration risk is considerably reduced. Bearing in mind the nature and scope of the ongoing and recently completed Basel workstreams, even an overall zero or near-zero increase at the global level could have uneven impacts across regions. Additionally, an overall zero or near-zero increase at the bank level might mask a significant increase at a more granular level (e.g. business line), creating potential unintended distributional consequences. Thus, some observers have called for a pause in reforms that are not currently finalized to give time for an adequate implementation of Basel III rules, to understand the real impacts of recent reforms, to give visibility to both banks, their shareholders, and debtholders, and to promote growth in a context of reduced regulatory uncertainty. On the other hand, some observers would rather promote a rapid finalization of the ongoing workstreams in order to reach the same objectives: diminishing uncertainty, giving clarity and reaching a neutrality of coming reforms on business models and economic growth.

Second, the calibration of capital requirements needs to consider the impact of structural reforms and the resulting benefits to financial soundness and the presumably diminished need for higher capital requirements.

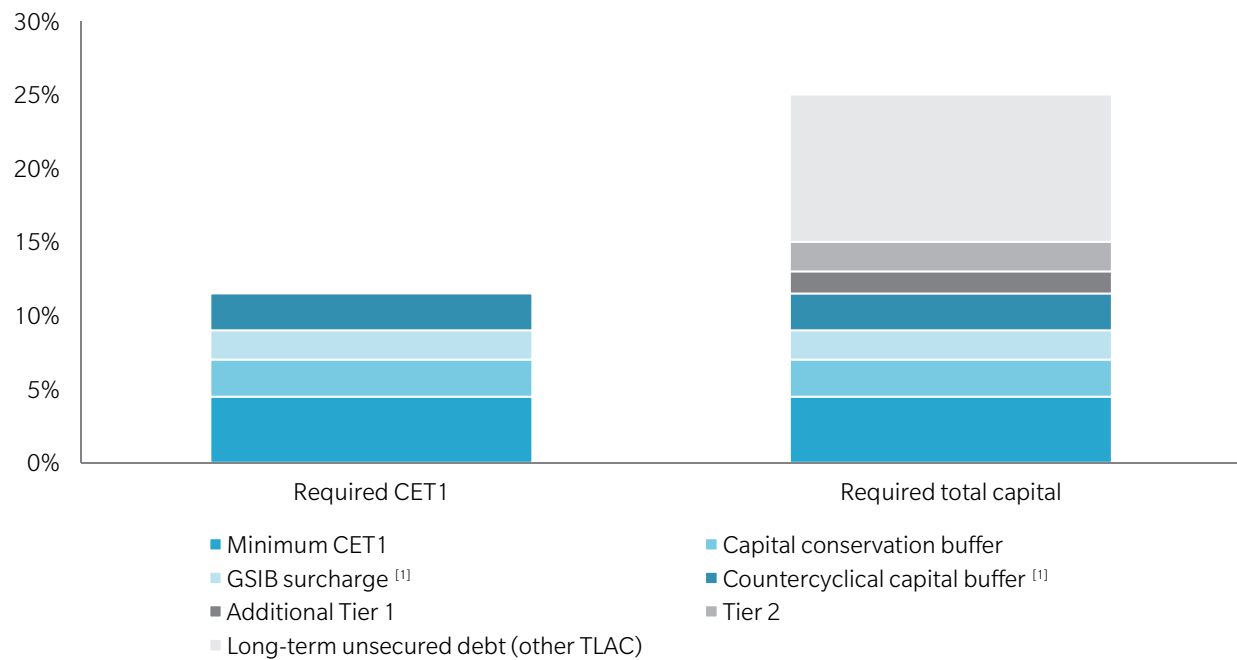
Third, the calibration of capital requirements needs to consider the impact of TLAC (as will be discussed shortly). Consideration of these factors jointly may merit a review of the total calibration of capital requirements.

6.2.2. CALIBRATION OF TLAC

Optimal calibration of TLAC, when considered jointly with calibration of regulatory capital, has also come into question. While TLAC is intended to serve a primary different purpose than capital (ensuring post-default loss-absorbing capacity vs. lowering the risk of default, respectively), it is worth mentioning that, as Dagher et al (2016) note, TLAC can fulfill part of the function that equity capital has traditionally fulfilled.¹⁷⁸ As discussed in Section 4, the calibration of TLAC requirements has an impact on overall amounts of capital, and consequently will have an impact on bank funding costs. An estimated total capital requirement for G-SIBs is shown below.

¹⁷⁸ Dagher et al (2016)

FIGURE 6.3: G-SIB CAPITAL REQUIREMENTS, INCLUDING BASEL REQUIREMENTS AND TLAC

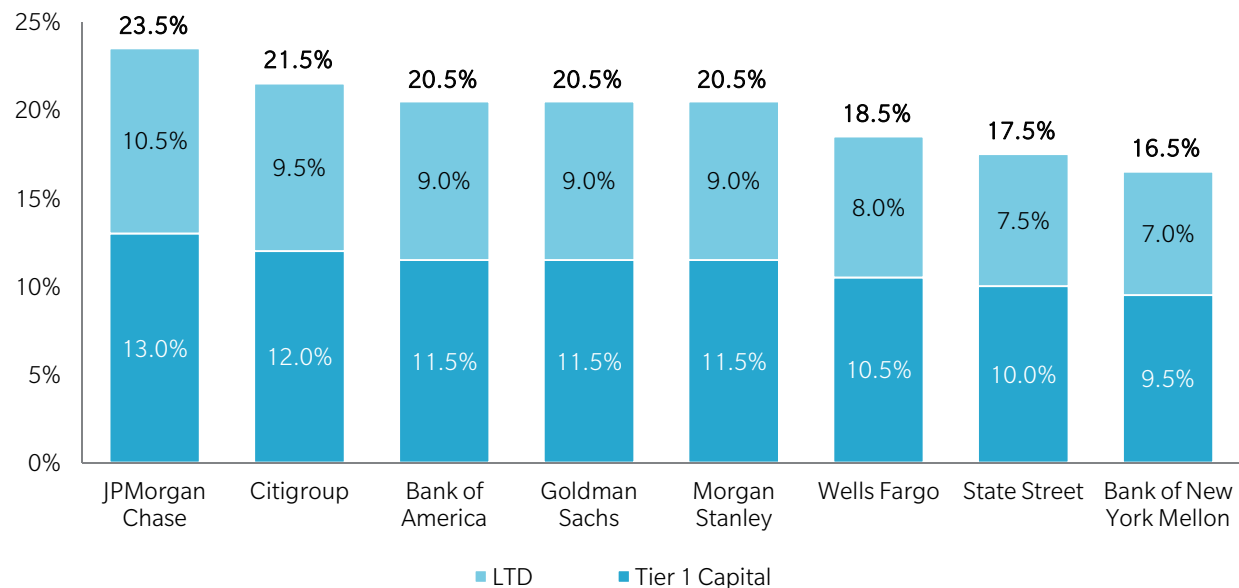


[1] GSIB surcharge (2%) and countercyclical buffer (2%) are illustrative; actuals are calculated by banks individually

Source: FSB (2015), BCBS (2013c), and Oliver Wyman analysis

TLAC requires substantial amounts of long term debt as part of the capital structure and is expected to generate substantial issuance for long-term debt. This is especially significant for deposit-funded banks, which have not traditionally relied on debt obligations to manage their balance sheets. As shown in the figure below, the major banks subject to TLAC in the US need long term debt equal to 9% of RWA on average.

FIGURE 6.4: CAPITAL REQUIREMENTS FOR US GSIBS



Note: This chart does not depict 1) the amount of external TLAC that would be required under the proposed rulemaking, or 2) any higher amount of LTD that could be required if calibrated under the proposed external LTD requirement's leverage approach (4.5% of the firm's total leverage exposure)

Source: Federal Reserve System (2015a)

As shown in the figures above, when the existence of CET1 requirements is considered, the overall level of TLAC will be around 20% for the US G-SIBs. For example, analysis conducted by The Clearing House pointed to the fact that the "FSB's proposed TLAC requirement of 16–20% of risk-weighted assets, plus the 2.5% capital conservation buffer and the G-SIB surcharge is in excess of the loss absorbency necessary to prevent against [sic] even the most extreme historical or stress loss estimates." For the US, a 16% TLAC requirement would produce total loss absorption capacity that is "4.4 times greater than the average losses projected for US G-SIBs under the Federal Reserve's *severely adverse scenario* for the 2014 Dodd Frank Annual Stress Testing (DFAST) stress testing and Comprehensive Capital Analysis and Review (CCAR) exercise ... [and] 2.6 times greater than average historical losses experienced at the largest failed US financial institutions." Similarly, European market participants (e.g. European Association of Co-operative Banks) have argued that TLAC requirements are too high.¹⁷⁹

Some official sources have also indicated that the optimum level of capital in the banking system, in fact, would be lower once the additional TLAC requirements are taken into consideration. The Bank of England's Brooke et al. (2015) estimates that "once resolution requirements and standards for additional loss-absorbing capacity that can be used in resolution are in place, the appropriate level of capital in the banking system is significantly lower than these earlier estimates, at 10–14% of risk-weighted assets." The authors' findings show that considering TLAC guidelines on minimum levels and eligible asset types as a part of an optimal capital analysis may lower the estimated necessary Tier 1 capital ratios, in this study from the previously estimated 16–19% to 10–14%.¹⁸⁰

It must also be noted that the previously discussed RWA inflation is likely to impact bank TLAC needs, as TLAC calculations are also dependent on RWAs. Thus, these reforms may essentially push TLAC out beyond the current calibration.¹⁸¹

¹⁷⁹ Brooke et al. (2015), SIFMA (2015a), EBF (2015), EACB (2015)

¹⁸⁰ Ibid

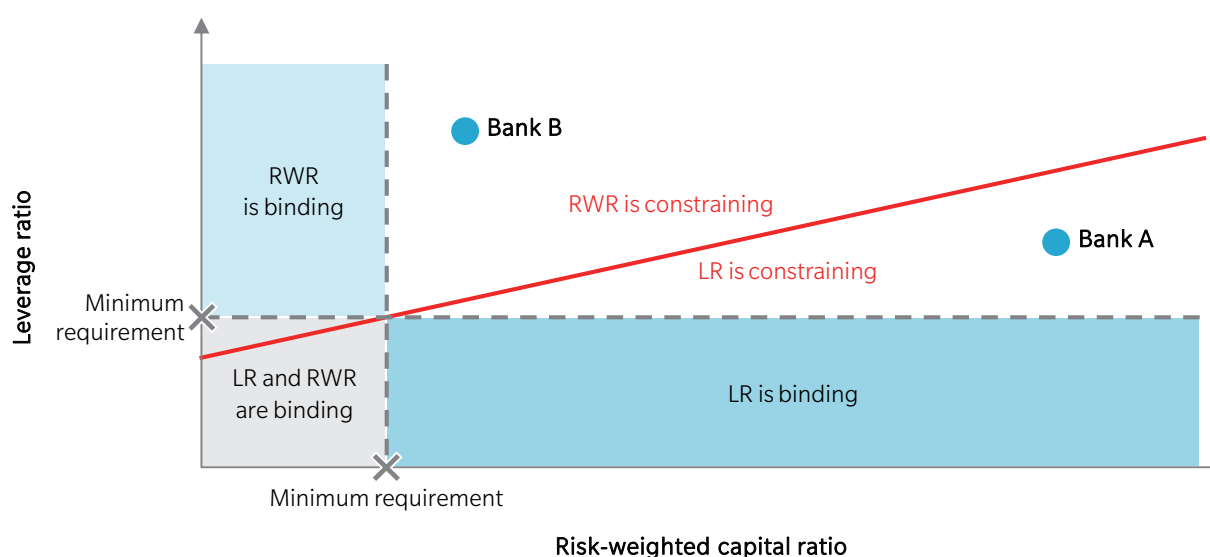
¹⁸¹ Dawn (2015), Durand (2015), Keenan and Spick (2015), KPMG (2015), Macquarie Equities Research (2016), The Economist (2015), Turner (2012)

Finally, the calibration of “internal TLAC” may also warrant a review. Some believe that it is too high and that the sum of 75–90% of the individual internal TLAC requirements of subsidiaries will likely be greater than the 100% TLAC requirement for the consolidated balance sheet of some parent companies. This may occur if the subsidiaries have varying constraints and business models, for example if some rely on external debt instruments and others operate with funding surpluses. When the constraints used to calculate the TLAC requirement are also applied to internal TLAC, even scaled down to 75–90%, the sum of internal TLAC may exceed consolidated external TLAC.¹⁸²

6.2.3. CALIBRATION OF THE LEVERAGE RATIO

In addition to the overall calibration of risk-based capital reforms, there are concerns with the calibration of the leverage ratio (LR). Even though the calibration is ongoing, market participants have raised concerns about incentives created by the LR (as discussed earlier in the chapter), and the fact that the LR could be a binding constraint for a large share of banks. The figure below illustrates the conditions under which the LR becomes binding.

FIGURE 6.5: HOW THE LEVERAGE RATIO IS LINKED TO THE TIER 1 RISK-WEIGHTED CAPITAL REQUIREMENT



Note: The red diagonal line represents combinations of the LR (T1/EXPLR) and the risk-weighted capital ratio (T1/RWA) for which the banks density ratio (DR) is exactly equal to the threshold DR (i.e. the minimum LR requirement divided by the minimum RWR). Bank A, for example, meets both minimum requirements (i.e. it is not bound by either of them). Yet Bank A is constrained by the minimum LR requirement, which means that the regulatory capital required to meet this requirement is higher than the amount due to the minimum RWR. For Bank B, by comparison, the RWR is constraining.

Source: Fender and Lewrick (2015a)

The darker blue area in the figure represents the combinations of the LR and risk-weighted capital ratio for which a bank (or a department/business line in a bank) would be bound by the LR. The light blue area in the figure above represents the conditions of the LR and risk-weighted capital ratio for which the risk-weighted ratio is binding. Whether the LR is constraining (as indicated by the red line in the figure above) is dependent on how banks RWA density compares with the threshold RWA density (or “critical” average risk weight) implied by the combination of the minimum LR and risk-weighted capital ratio requirements. The RWA density “denotes the average risk weight per unit of exposure for any given bank.”¹⁸³

¹⁸² EBF (2015)

¹⁸³ Fender and Lewrick (2015a)

The BIS has stated that the leverage ratio is intended to “reinforce the risk-based requirements with a simple, non-risk-based backstop”¹⁸⁴ and indicated that “target shares of up to 50% would be consistent with the backstop concept underpinning the LR,”¹⁸⁵ thus indicating that the LR may have been intended to impact a significant number of banks. The leverage ratio is expected to only impact banks or activities with a low average risk-weight. However, some research points to the fact that the LR may be binding for a higher share of banks than intended. For example, a March 2016 EBA monitoring exercise indicates that the leverage ratio at 3% serves as a binding constraint for a large proportion of EU regulated banks due to RWAs and EU market structures. According to the report, nearly 90% of European G-SIBs would be constrained by the LR (vs. Tier 1 risk-based minimum requirements).¹⁸⁶ The share of banks constrained by the LR appears to decline with decreasing bank size for non-G-SIBs. Additionally, the LR continues to be a binding factor for banks even when the capital conservation buffer and G-SIB buffer are taken into effect: even with these requirements the LR continues to be a binding factor for over 44% of G-SIBs. Additionally, a Basel III leverage ratio survey, commissioned by GFMA/The Clearing House, showed that the leverage ratio becomes the binding capital ratio for ~50% of institutions for a leverage ratio of 3% (44% of G-SIBs and 56% of non G-SIBs) and rises to ~90% (93% of G-SIBs and 88% of non G-SIBs) for a leverage ratio of 5%. It is important to note that such studies are based on LR definitions prior to the 2016 revisions to the leverage ratio framework. This indicates that the leverage ratio may function as more than a backstop. Analyzed at a more granular level, the leverage ratio acting as a binding constraint could also have potential negative consequences for market liquidity, as it poses a high cost to conducting low-risk repo transactions and to carrying market-making inventory, as discussed in Section 5.¹⁸⁷

There may also be some distributional consequences to the LR, as an AFME study finds that “for a universal bank the leverage ratio presents a greater constraint than for a broker-dealer.”¹⁸⁸ Additionally, a European Commission summary of responses to a call for evidence on the EU regulatory framework for financial services noted that some respondents “also argued that the leverage ratio could reduce diversity, as it would have a disproportionate impact on low risk-weighted business models such as specialized community banks, building societies and mortgage banks.”¹⁸⁹ Thus, it is worth considering if the LR could create potentially significant distributional differences that reduce diversity and could thus drive higher concentrations of risk.¹⁹⁰

PARTIAL MIS-CALIBRATION OF REFORMS

Even if the overall calibration of capital and liquidity is appropriate, there could be issues with partial mis-calibration of reforms when certain components of the rule are inappropriate. This can become particularly apparent in the calibration of risk weights, definitions of assets eligible for inclusion in capital or liquidity buffers, or the results of methodological assessments (e.g. Standardized Approach, Internal Ratings-Based (IRB) Approach, etc.).

6.2.4. CALIBRATION OF LCR

As an example of a potential partial mis-calibration of eligible assets, we consider the case of assets included in the LCR. The LCR has been criticized as a rigid rule given its assumptions that the trigger factors such as downgraded ratings will remain constant during the full stress period. A European Commission study¹⁹¹ discusses the argument

¹⁸⁴ BCBS (2013f)

¹⁸⁵ Fender and Lewrick (2015a)

¹⁸⁶ EBA (2016b) indicates that the degree of binding power of risk-based vs leverage Tier 1 capital requirements on G-SIBs Group 1 banks is 88.9% (proportion of banks constrained by the LR)

¹⁸⁷ Fender and Lewrick (2015a), EBA (2016b), AFME (2011a), BCBS (2013f), European Commission (2016) – based on summary of comments, GFMA and The Clearing House (2013a), GFMA and The Clearing House (2013b); IIF (2014).

¹⁸⁸ AFME (2011a).

¹⁸⁹ European Commission (2016) – based on summary of comments.

¹⁹⁰ Fender and Lewrick (2015a), EBA (2016b), AFME (2011a), BCBS (2013f), European Commission (2016) – based on summary of comments, GFMA and The Clearing House (2013a), GFMA and The Clearing House (2013b); IIF (2014).

¹⁹¹ European Commission (2014a).

that the asset pools considered for LCR inclusion may be too prescriptive and restrictive. Liquidity definitions for Level 2B Assets have allowed only for the inclusion of RMBS to calculate the HQLA stock. However, corporate bonds, covered bonds, and other components of the highly liquid asset-backed securitization (ABS) asset classes, such as ABS backed by auto loans and credit cards, were not included in the liquidity definitions. This is a possible case of mis-calibration, as the rule may not treat underlying risk associated with these assets consistently. Additionally, since liquidity arises from refinancing in the public market, interbank market, and with central banks, there is an argument that there is little reason to differentiate between RMBS and other types of ABS. Consequently, since some high-quality ABS are an important long-term financing instrument available to investors, it is argued that they should receive a different treatment under the LCR. According to the same European Commission study, a counter-argument to this example of mis-calibration is that “it is well known that some securities can be highly illiquid and there is no market price on a continuous basis.” As such, there could be good reasons to limit the eligible assets. This issue is also related to national implementation, as the specific calibration differs by region.¹⁹²

6.2.5. CALIBRATION OF SOVEREIGN DEBT WEIGHTS

The calibration of risk weights for different asset classes has also been questioned by market participants. First, risk weights for sovereign debt are potentially mis-calibrated and may be lower than appropriate given their underlying risk. The first Basel Accord stipulated a zero risk-weighting for many sovereign exposures, which is supported in theory by the assumption that sovereigns are able to collect taxes and to print money to repay debt. Though subsequent Basel frameworks modified the rule to determine risk-weights based on an external risk rating, the final risk determination for sovereigns often remains at zero or slightly above zero. This is due in part to a sparse or blank history of default but is also due to the greater regulatory leniency towards the prescription of risk weights for sovereigns. For example, sovereign debt is exempt from a 3-bp PD floor in internal calculation of risk weights and sovereign jurisdictions have the prerogative to allow lowered risk weights on their own debt. Banks using the IRB approach rely on their own assessments. Some within the industry have raised concerns about standardized approach potentially underestimating sovereign risk for some nations.¹⁹³ At the time of drafting of this report, the treatment of sovereign risk was a part of the BCBS’ 2015–2016 program.¹⁹⁴

6.2.6. CALIBRATION OF MORTGAGE WEIGHTS

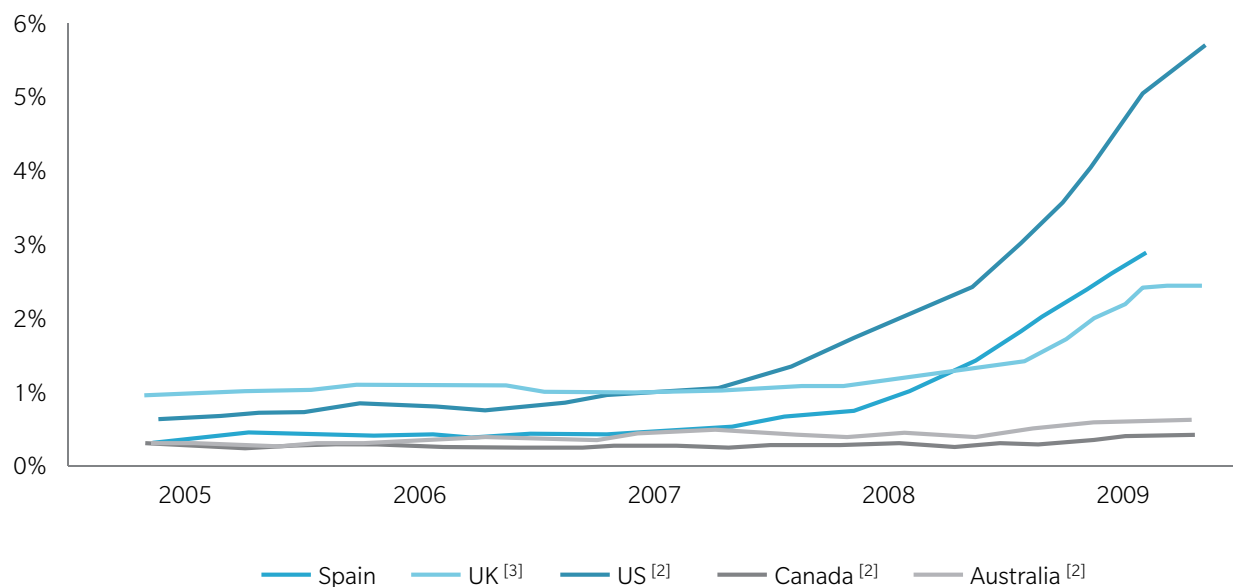
Market participants have also raised concerns with the calibration of risk weights for mortgage loans. The BCBS’s framework for risk weightings of mortgage loans may not fully consider important jurisdictional differences. For example, mortgage risk may be affected by local differences of market conditions (supply and demand for mortgages), taxation, legal considerations (recourse vs. non-recourse), and other structural differences as reflected by historical default rates. As such, mortgage risk weightings could be mis-calibrated if they do not accurately reflect the differences in underlying risk of loans. This limits the current comparability of risks across different jurisdictions, areas, and systems. The figure below points to the difference in loss rates during the last crisis.¹⁹⁵

¹⁹² European Commission (2014a)

¹⁹³ Visco (2016), Harris (2015), ESRB (2015), Jones (2015), Turner (2011), Jenkins (2016), Council on Foreign Relations (2015)

¹⁹⁴ Liu and Morley (2013), Jenkins (2016), Visco (2016), Harris (2015), ESRB (2015), Jones (2015)

¹⁹⁵ EBA (2016c), IIF, GFMA, ISDA, and IACPM to BCBS (2016)

FIGURE 6.6: NON-PERFORMING HOUSING LOANS¹

[1] Percent of loans by value. Includes “impaired” loans unless otherwise stated. For Australia, only includes loans 90+ days in arrears prior to September 2003

[2] Banks only

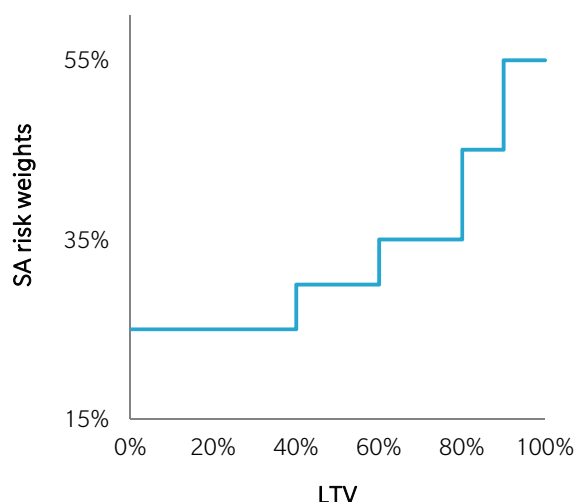
[3] Percent of loans by number that are 0-+ days in arrears

Sources: APRA, Bank of Spain, Canadian Bankers’ Association, Council of Mortgage Lenders, FDIC, and RBA data (from Lea (2010))

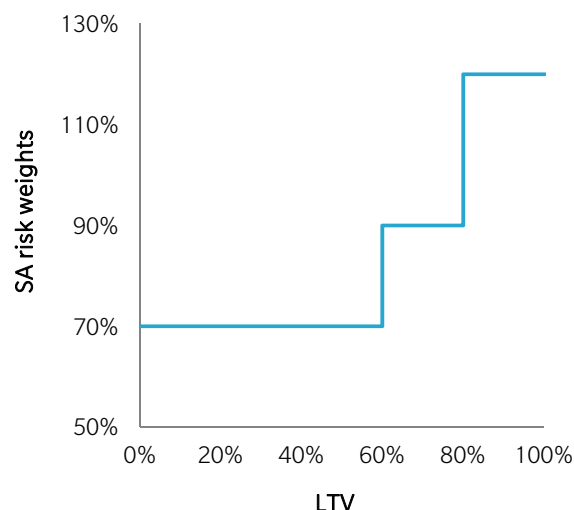
There are additional concerns with the calibration of risk weights based on the LTV buckets. Currently, risk weights for exposures are determined primarily based on the LTV range (or “bucket”) of the loan. The significant differences in risk weights between buckets could create potential cliff effects, where a small increase in LTV can result in a large increase in risk weight if the loan is pushed to the next bucket.

FIGURE 6.7: RESIDENTIAL REAL ESTATE LTV BUCKETS

Residential Real Estate LTV buckets
Not materially dependent on cash flows



Residential Real Estate LTV buckets
Materially dependent on cash flows



Source: BCBS (2015k)

As such, it is likely that loans would cluster around the border of LTV buckets, reducing the risk-sensitive value of lower LTVs within the existing LTV bands. This would indicate insufficient granularity in LTV bucket calibration. Some market participants also argue that the overall calibration of LTV buckets could be improved to account for interactions with other measures, such as the countercyclical buffer. This will be discussed in further detail later in this section.¹⁹⁶

6.2.7. CALIBRATION OF CREDIT CONVERSION FACTORS (CCF)

There are concerns with the calibration of CCFs in the BCBS's review of the standardized approach for credit risk. The BCBS consultative document proposed to calibrate CCF for all unfunded commitments (except retail unconditionally cancellable) at between 50% and 75%. Market participants have emphasized that this calibration is significantly above the historical levels experienced in the industry. This includes unfunded commitments to regulated investment funds, such as US mutual fund and EU UCITS, where industry data shows cumulative draw-down rates, even at the height of the financial crisis, of less than 10%.¹⁹⁷

There are a number of other concerns with the calibration of CCFs, including for retail unconditionally cancellable commitments (UCCs). In a 2016 study, The Clearing House conducted a study using data from large US bank holding companies and found that the "aggregate CCF for all retail UCCs of the Retail Participating Banks... is significantly lower (7.4%)" than the 10–20% range currently proposed by the BCBS.¹⁹⁸ Any potential for mis-calibration of CCFs could be passed onto the end user in the form of higher pricing or reduced availability of credit

¹⁹⁶ Ibid

¹⁹⁷ State Street to Robert de V. Frierson, Secretary Board of Governors of the Federal Reserve System (2013)

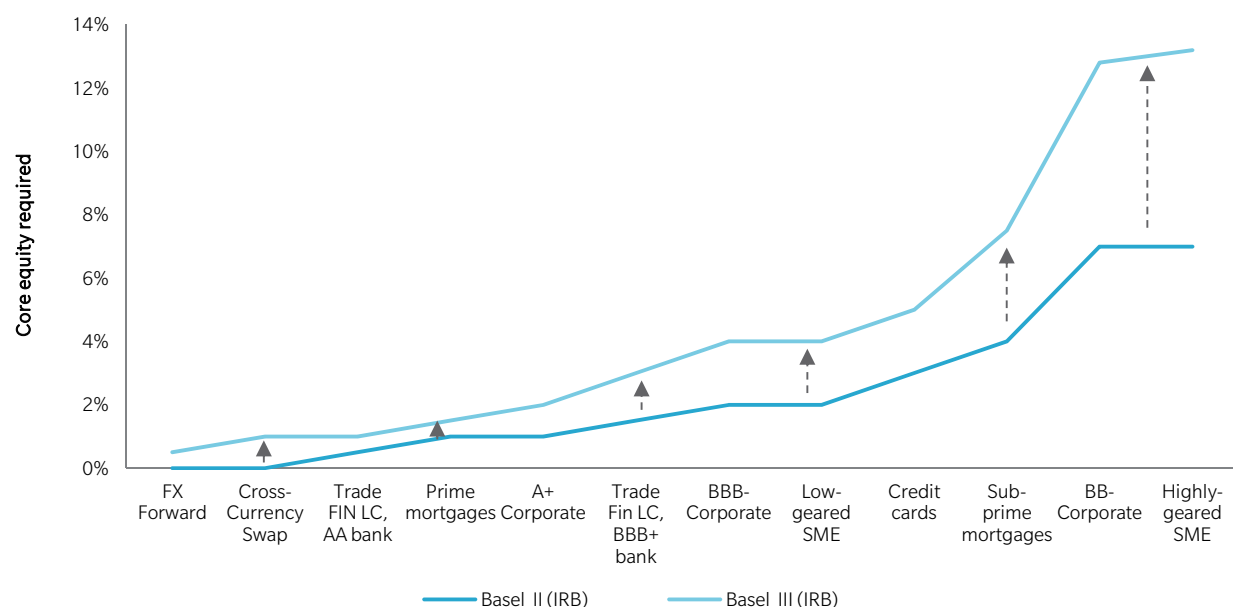
¹⁹⁸ The Clearing House (2016), aggregate CCF estimate "uses current amount for exposures and risk-weighted assets (RWA) to calculate the implied CCF that makes undrawn exposures RWA under the Standardized Approach equal to undrawn RWA under the Advanced Approaches (AA-implied CCF)"

or other financial services.¹⁹⁹ For example, mis-calibration of CCFs could pose some concerns for project and export finance.

6.2.8. CALIBRATION OF STANDARDIZED APPROACH LEADING TO REDUCTION IN RISK SENSITIVITY

There are concerns that the calibration of the latest credit risk standards may reverse the progress made towards a more risk-sensitive capital framework by reducing risk sensitivity. As indicated in Figure 6.8, taken from IIF (2016), Basel III broadly increased the required capital levels proportionally across the credit spectrum.

FIGURE 6.8: CAPITAL ACROSS ASSETS: BASEL III IMPACT SO FAR



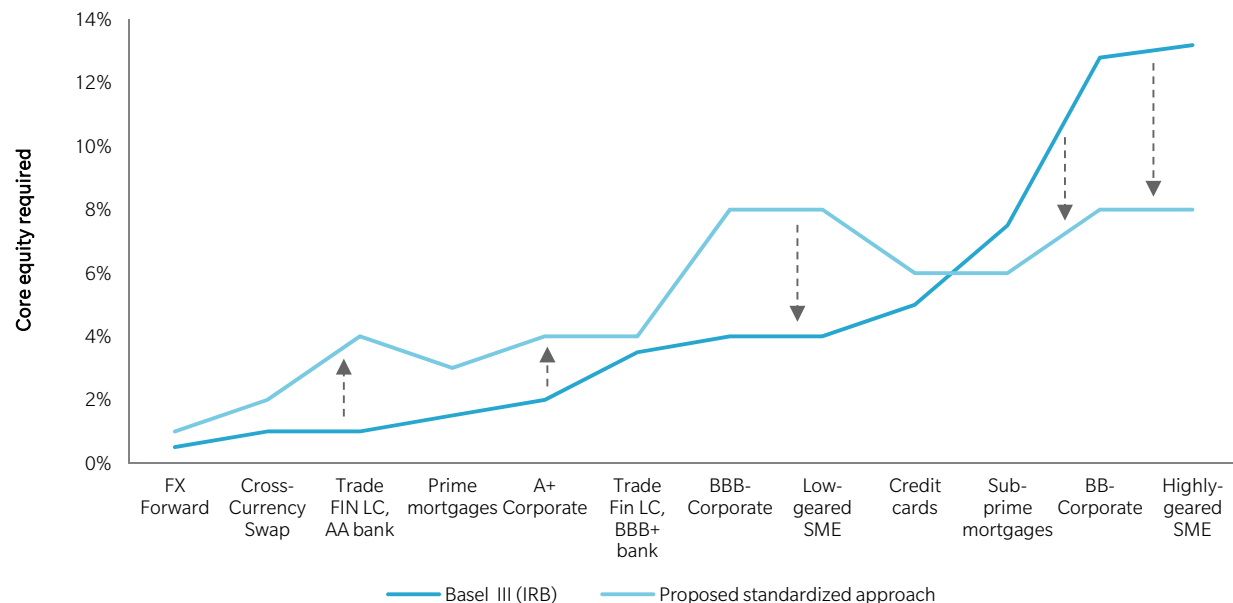
Source: IIF (2016)

Internal models currently used by banks enable them to adequately compensate for risk and generate a return by varying pricing of products based on underlying risk. However, changes to the credit risk approach (and related capital floors) actually reduce sensitivity for some asset classes, as indicated in Figure 6.9. This may create distortions to the relationship between risk and capital and could impact bank pricing and the shape of a bank's portfolio. For example, the differentiation of treatment of highly-g geared SMEs and low-g geared SMEs is reduced with the proposed standardized approach. This would create an incentive for banks to invest more of their capital in highly-g geared SMEs given the opportunity for higher returns.²⁰⁰

¹⁹⁹ BCBS (2015k), BCBS (2015k), IFF, GFMA, ISDA, and IACPM to BCBS (2016), The Clearing House, SIFMA, and FSR to BCBS (2016), ICC to BCBS (2015)

²⁰⁰ IIF (2014), IIF (2016)

FIGURE 6.9: CAPITAL ACROSS ASSETS: POTENTIAL NEW CHANGES



Source: IIF (2016)

6.2.9. CALIBRATION OF NSFR

Some of the NSFR requirements relating to derivatives may have material detrimental effects on the hedging costs of end clients. Recent quantitative work by the Joint Trade Associations on derivatives indicates that the current treatments under the NSFR would lead to a total estimated additional funding requirement of around €750 BN leading to an annual cost of between €12–15 BN that would need to be passed to end-users²⁰¹. Around half of this additional requirement is due to the application of stringent Basel III leverage ratio netting criteria to variation margin whereby collateral must fully match the exposure before it may be considered for netting. The application of leverage ratio criteria, which is aimed at capturing a bank's non-risk-adjusted exposure to NSFR, which is aimed at assessing a bank's funding sources and requirements, may result in an overly conservative estimate of long-term funding required. Further, NSFR rules require collateral to be in the form of cash only, which is inconsistent with the definition of liquid assets under the LCR.

NSFR rules may also have potential unintended or disproportionate impacts on banks' ability to provide market services which facilitate client financing, investing and hedging, in particular through the exemption or non-exemption of interdependent assets and liabilities as per the provisions of Paragraph 45²⁰² of the new standard. BCBS guidelines on qualification criteria are not sufficiently prescriptive, due to which interpretation of Paragraph 45 may differ between national regulators. As a result, a number of linked transactions, including derivatives market risk hedges, client clearing transactions, and client short facilitation trades may end up being excluded from paragraph 45 exemption.

²⁰¹ GFMA, ISDA and IIF (2015)

²⁰² Paragraph 45 of the BCBS NSFR standards allows for setting RSF (Required Amount of Stable Funding) and ASF (Available Amount of Stable Funding) to zero on transactions which qualify as linked transactions according to certain criteria

6.3. POTENTIAL DUPLICATION OR INTERACTION OF COVERAGE

A special case of mis-calibration can occur when rules may be appropriate taken individually, but their interaction results in undue regulatory burden on certain products or on the system as a whole. Given the sheer volume of regulatory changes since the crisis, there may be specific cases where reforms overlap, potentially creating a duplication of requirements. According to GFMA, IIF, and PwC (2015), these tensions between different reforms can “stifle the effectiveness of individual reforms and add complexity and unintended consequences.” In particular, the report notes that there could be cases where a given market participant “is required to meet similar obligations resulting from different pieces of legislation, or where different legislation appears to pursue the same objectives.” These interactions may have unintended adverse impacts on the lending channel and financial markets liquidity.

6.3.1. NSFR, LCR, AND G-SIB BUFFER (ADDRESSING MATURITY MISMATCH AND SHORT-TERM WHOLESALE FUNDING)

One example of a potentially unintended interaction of reforms is the interaction of NSFR, LCR, and the US G-SIB buffer. NSFR and LCR are aimed at reducing liquidity risk and were calibrated with the understanding that maturity mismatch is not addressed by other rules. However, in the US the G-SIB surcharge method 2 methodology is also designed to encourage banks to fund with long-term liabilities (by focusing on a firm’s reliance on short-term wholesale funding). Thus, liquidity funding is thus actually addressed multiple times, leading to overall requirements that could be excessive in aggregate.²⁰³

6.3.2. CAPITAL FLOORS

There are concerns that the leverage ratio and capital floors may be duplicative. As discussed earlier in the section, the leverage ratio is intended to function as a backstop. Capital floors (based on the standardized approach), though still pending final calibration, essentially serve the same function by ensuring that the capital levels within the banking system do not drop too low based on risk-weighted calculation. Based on the design, these measures would act as a backstop to bank’s risk-weighted capital ratio calculations by being a “floor” on the minimum calculation of risk-weighted assets (and reducing the sensitivity of internal model approaches). However, capital floors would then duplicate the purpose of the leverage ratio, which is intended as a backstop, leading some industry participants to question why a second backstop is needed.²⁰⁴ This issue is further exacerbated by the “proposal to have both an output capital floor and the series of parameter input floors as well,” which would further increase complexity.²⁰⁵

6.3.3. STEP-IN RISK

Some market participants have noted that there is potential for duplication in the Basel Committee’s proposed guidance on identification and measurement of step-in risk. Furthermore, in the case of sponsored funds, market participants have objected to what they see as the use of inappropriate indicators for the identification of step-in risk, the lack of recognition for the broad range of legal, regulatory and contractual mandates which limit the ability to provide financial support to a sponsored fund, and the Basel Committee’s undue reliance on regulatory capital as a means of addressing any residual concerns. The industry has argued that capital requirements for step-in risk are unnecessary because changes to accounting standards, regulatory capital rules, new requirements for liquidity management, and other regulations have either imposed new requirements on banks to recognize implicit risks in activities covered by the step-in risk regulation, or have in essence prevented banks from performing those

²⁰³ GFMA, IIF and PwC (2015), GFMA and IIF to the Federal Reserve System (2016), Tarullo, D. to Board of Governors (2015).

²⁰⁴ Schwartzkopff (2015), Glover (2016),

²⁰⁵ IIF to Mr. William Coen (2016)

activities. As such, the proposed requirements for step-in risk could be duplicative of the regulation that has already addressed this risk.²⁰⁶

6.3.4. CET1 RATIO, LEVERAGE RATIO, AND STRESS TESTING

There are likely to be unintended interactions between the CET1 risk-weighted capital requirement ratio, the leverage ratio, and stress testing. All of these regulatory requirements may act as binding constraints on banks depending on calibration and the portfolio composition of a bank. This becomes a concern when the binding constraint changes every year due to re-calibration of reforms, additional reforms increasing a bank's RWA, or changes in stress-testing requirements (the last example in particular is prone to change as regulators generally vary stress testing scenarios annually).

The shifting binding constraint could make it very challenging for banks to optimize their portfolio and could lead to erratic buying and selling behavior year-to-year. This would be a particular concern in capital markets.²⁰⁷

6.4. POTENTIAL UNINTENDED CONSEQUENCES

6.4.1. SHADOW BANKING

An example of the potential for unintended consequences of Basel reforms is the incentive for growth of concentration of exposure in non-regulated or lightly regulated entities, commonly referred to as shadow banking. As banks reduce their supply of some products and services due to regulatory burdens, these services may move into the shadow banking sector.²⁰⁸ There is debate as to whether this poses a concern for overall market stability. The primary issue is that increased market share for unregulated market participants may lead to a decrease of overall market stability by pushing activities to the less visible and controllable sectors of the financial system.²⁰⁹ For example, unregulated entities, such as financial technology firms, are not "subject to the same regulatory requirements even when offering identical services."²¹⁰

Some researchers have begun to examine the growth of shadow banking. For example, Meeks, Nelson, and Alessandri (2014) find that high leverage in the shadow banking system makes the economy particularly vulnerable to aggregate disturbances. Other studies, such as Kashyap, Stein, and Hanson (2010) discuss the presence of shadow banking, but do not quantify the impacts of the shadow banking sector. The growth of the shadow banking sector is particularly concerning, as it could be both the result of, and a driver of, end-users moving away from the regulated to the unregulated banking sector.²¹¹

It could be argued that the shadow banking system has developed and grown without the influence of Basel reforms. While that may be true, if implementation of reforms effectively pushes certain activities out of regulation and increases the quantity of unregulated activity (which may include lower quality loans), this may pose significant risks and create instability within the financial system.²¹² For example, uninsured funding in the shadow banking sector opens up the risk of runs. Additionally, studies have found that tail risk may be systematically underpriced in shadow banking transactions which may lead to accumulation of systemic risk.²¹³

That said, not all movement of activities away from banks into more lightly regulated entities is inappropriate or dangerous, as there are potential benefits of the shadow banking. If shadow banks increase the availability of credit

²⁰⁶ The Clearing House to BCBS (2015b)

²⁰⁷ J.P. Morgan Chase (2013), Gallardo, Schuermann, Duane (2015)

²⁰⁸ Nier and Zicchino (2005)

²⁰⁹ Meeks, Nelson, and Alessandri (2014); Kashyap, Stein, and Hanson (2010)

²¹⁰ Kashyap, Stein and Hanson (2010), European Commission (2016) – based on summary of comments

²¹¹ Meeks, Nelson, and Alessandri (2014), Kashyap, Stein, and Hanson (2010)

²¹² Kashyap, Stein and Hanson (2010), IMF (2014), Meeks, Nelson, and Alessandri (2014)

²¹³ Adrian and Ashcraft (2012)

to consumers, their existence may improve the stability of the financial system. Shadow banks may also be more efficient than traditional banks in certain ways, such as through specialization in niche credit types. Additionally, the shift of lending activity from traditional banks to shadow banks may actually reduce the concentration of financial activity in systemically important institutions, therefore reducing systemic risk and correlation of risk.²¹⁴

Judgment must be exercised by policymakers as to whether a given activity carries sufficient systemic risk that it is better kept within the regulatory perimeter of banks and other highly regulated institutions.

6.4.2. PROCYCLICALITY

There are concerns that procyclicality is an unintended consequence of Basel reforms. This concern is not new: a number of previously issued Basel regulations (including Basel III) were considered procyclical. For example, during periods of stress and as bank capital levels begin to decrease, banks may reduce their lending in order to maintain their Tier 1 and total capital ratios. However, reduced lending across the market as a whole may result in further contraction and instability.²¹⁵

Basel III identified and sought to address the procyclicality through regulations such as the countercyclical capital buffer (CCyB). The countercyclical capital buffer is designed to create additional capital buffer requirements for periods when credit growth exceeds a certain limit. The dual function of the CCyB is to first, require banks to maintain a larger capital buffer during peak periods that can be used during economic downturns and second, to slow the excessive credit growth during booms. To determine the appropriate time to apply the CCyB, supervisors exercise discretion but consider as a key indicator the gap between credit-to-GDP ratio and its trend.²¹⁶

However, some argue that the effectiveness of the CCyB may be reduced if there is a lag in the application of the buffer such that the usage of the buffer overlaps with a portion of an economic downturn. The potential issue may be caused by, first, a misalignment between the credit-to-GDP gap trigger and the economic peak period, and secondly, a built-in delay between the trigger and the actual implementation of the buffer in order to give banks enough time to adjust. However, regulators have the ability to initiate the buffer ahead of the credit-to-GDP gap trigger and can shrink the adjustment window to reduce the potential for procyclicality.²¹⁷

6.4.3. LEVERAGE RATIO INCENTIVES FOR DEPOSITS (HELD AT CENTRAL BANKS)

Recently factors such as market volatility, increased regulation, and monetary policy, have driven a strong influx of large cash deposits into the US banks, and especially custody banks. The figure below highlights the growth in liquid assets held by mutual funds since 2007, and therefore growth in deposits at custody banks which provide safekeeping, asset administration and banking services to such funds.

²¹⁴ ICMA (2012)

²¹⁵ Kowalik (2011), Arjani (2009)

²¹⁶ Repullo and Saurina (2011), Repullo and Suarez (2012), McDonnell (2013), Athanasoglou and Daniilidis (2011)

²¹⁷ Ibid

FIGURE 6.10: TOTAL LIQUID ASSETS OF MUTUAL FUNDS



Source: Federal Financial Analytics (2015), Investment Company Institute. Dollars in billions. Liquid assets reflects cash, receivables, and short-term securities minus liabilities)

Excess deposits held by custody banks are usually placed at national central banks, thus making these deposits essentially riskless to the overall financial system. However, a leverage capital charge is still applied to the placement of these deposits. This creates an incentive for the custody banks to reject cash deposits if they are approaching the desired (or dictated) LR minimums. As a bank approaches the leverage ratio minimum, it has to evaluate the cost of additional capital against the return on an asset (expected to be relatively low), and whether returns are sufficient to meet shareholder expectations.

The table below illustrates the impact of funds held at central banks on the leverage ratio of the three major stand-alone US custody banks.

TABLE 6.4: INFLUENCE OF CENTRAL BANK PLACEMENTS ON CUSTODY BANKS' LEVERAGE RATIO

INSTITUTION	TIER 1 CAPITAL	CENTRAL BANK PLACEMENT	TOTAL ASSETS FOR THE LEVERAGE RATIO	LEVERAGE RATIO	LEVERAGE WITHOUT CENTRAL BANK PLACEMENTS
BNY Mellon	17,693,169	93,211,368	309,371,472	5.72%	8.19%
Northern Trust	7,354,033	14,725,470	106,550,955	6.90%	8.01%
State Street	13,919,961	74,036,647	248,021,789	5.61%	8.00%

Source: Federal Financial Analytics (2015), FDIC call reports for 1Q2015. Dollars in thousands. The leverage ratio is calculated as Tier 1 divided by total assets for the leverage ratio; the last column removes Central bank placements from the assets counted for the leverage ratio denominator

Inclusion of these arguably risk-free deposits in the LR is essentially limiting the total amount of deposits a custody bank could accept without breaching the LR requirements in their national jurisdictions. In particular, Federal Financial Analytics (2015) found that if the LR charge did not apply to such deposits held at central banks, then "at least an additional \$182 billion in cash-deposit capacity" would become available. This becomes particularly important under stressed conditions when flight-to-cash deposits are brought to custody banks. If custody banks are not able to accept these deposits and hold them at national central banks, this could create conditions where end users are not able to safely store safe assets during times of stress.

Additionally, other banks not traditionally considered pure custody banks are likely to experience a similar increase in deposits and may also not be able to take these deposits in. For example, during the last financial crisis JPMorgan

Chase's deposits increased by over \$100 billion as investors fled to safety. However, in an annual report the bank stated that it is "unlikely that [JP Morgan Chase] would want to accept new deposits the next time around because they would be considered non-operating deposits (short term in nature) and would require valuable capital under both the supplementary leverage ratio and G-SIB." Thus, investor inability to deposit cash into banks, custodial or otherwise, could drive these cash deposits into possibly less safe alternatives, including shadow banks discussed above.²¹⁸

In addition to the concern about the incentives that the leverage ratio creates for deposits, there are concerns about other incentives for particular types of products. For example, there are concerns that the capital that banks have to hold against OTC positions (due to the fact that collateral that banks collect from clients to cover the initial losses is treated as an exposure) makes it uneconomical for banks to act as clearing members. As such, some clearing members have already stepped back from providing such services, which could reduce investor access to OTC markets.²¹⁹

6.4.4. IMPACTS OF LIQUIDITY REFORMS ON OVERALL MARKET LIQUIDITY

One potential unintended consequence may arise from the incentives created by the LCR and NSFR. While these rules work to increase stability and ensure liquidity at individual banks, this may happen at the expense of overall market liquidity. This issue is discussed in further detail and quantified to the degree possible in Section 5.

6.4.5. IMPACTS ON MARKET STRUCTURE

Some market participants have raised concerns about potential unintended consequences such as evolution in markets structure, particularly the exits from certain markets or products by regulated entities and the subsequent reduction in market liquidity, possibly limiting provision of financial services. These impacts on banks and end users are discussed in Section 5.

6.4.6. HQLA ALTERNATIVE LIQUIDITY APPROACHES (ALA)

One potentially unintended consequence of reforms arises from the definition of HQLA. One of the key components of HQLA is government securities. While in a number of jurisdictions this definition of HQLA poses no problem, there are some jurisdictions where government issued debt is in short supply (e.g. Australia, South Africa, Hong Kong, and Norway). For banks based in those jurisdictions, meeting NSFR and LCR's HQLA requirements poses a particular challenge, as an already limited supply of public sector securities is frequently locked away in long-term investment portfolios. BCBS has considered these challenges and presented three alternative liquid asset (ALA) options to satisfy HQLA within the applicable jurisdictions: 1) Committed liquidity facilities (CLFs) from the central bank for a fee; 2) Foreign currency HQLA, with haircuts to account for currency risk; and 3) Additional usage of level 2A assets, with higher haircuts.²²⁰

While these ALA approaches do help account for jurisdictional differences in availability of HQLAs, they present their own potential issues. Specifically, the second and third variant of ALAs discussed above, while expanding the number of assets eligible for HQLA status, do not link these assets to central bank liquidity policies. For example, level 2A assets are currently expected to be eligible as central bank collateral instruments whereas this is not the case for level 2B assets. Therefore, while these ALA arrangements allow banks to satisfy regulatory requirements they may reduce the ability of local central banks to respond to crisis conditions.²²¹

²¹⁸ Federal Financial Analytics (2015), J.P. Morgan Chase & Co. (2014), J.P. Morgan Chase & Co (2015)

²¹⁹ Rennison (2015), Acworth (2014)

²²⁰ Spencer (2014), Yanase (2013)

²²¹ Ibid

6.4.7. DISTRIBUTIONAL CONSEQUENCES

Unintended consequences may arise when some products or services are impacted by reforms more than other products or services. These distributional consequences may have significant impacts on the end users, and possibly on the overall economy. These issues are discussed in further detail and quantified to the degree possible in Sections 4 and 5.

As discussed above, there are possible issues with national implementation of Basel reforms. Reforms could be implemented in a sub-optimal way, or jurisdictional differences could create undue burdens for some market participants. However, jurisdictional implementation falls outside of the Basel Committee's control and as such is not discussed in significant detail in this report.

Moreover, this report does not address the interaction of Basel Committee regulations for banks and regulations of pension funds, insurance companies and mutual funds rules. In order to have a holistic view of potential issues, these should be taken into account by a comprehensive review conducted by regulators. For example, asset managers whose funds are subject to daily subscriptions and redemptions manage the liquidity risk by increasing cash buffers; however, the NSFR is a strong disincentive to receive these deposits by banks as they create a need for HQLA and accordingly a cost in leverage exposure.

7. CONCLUSIONS

The new and revised requirements related to bank capital, liquidity, and TLAC promulgated by the Basel Committee and the FSB represent major changes to a large, complex, and heterogeneous global financial system. The rules themselves run to thousands of pages including many technical calculations. Given all this, it is not surprising that there are a number of areas where knowledgeable observers are concerned about potential problems of duplication, harmful interactions between different rules, unintended consequences, and the sub-optimal calibration of requirements or the formulas for intermediate calculations. Indeed, it would be astonishing if there were no need for some re-evaluation and re-calibration.

The Basel Committee is to be commended for establishing a workstream to consider the “interaction, coherence, and overall calibration” of their reforms, as is the FSB for its own separate re-evaluation. As this report shows, there are many areas where it is possible that the reforms do not work as intended, either because the marginal costs of certain aspects outweigh the marginal benefits or because there are other undesirable and unintended consequences. The authors of this report are not able to do a full cost-benefit analysis and therefore we have chosen not to make specific recommendations, but we hope that the Basel Committee and FSB will look carefully at the potential problems that we have highlighted.

Additionally, the authors note that further research will be required to fully understand the impact of reforms. First, additional rigor could be applied to evaluating costs and benefits of financial reforms at a higher level of granularity: for example, the impact of liquidity reforms on a trading desk or product level. It will be critical to understand reforms’ impact on different segments of the market to identify potential areas of undue burden or impairment of the efficient functioning of the market. Second, the empirical research to date has focused primarily on the impact of capital, and to a lesser extent, liquidity regulation and the joint impact thereof on banks. Other reforms, for example margin requirements, have received less attention and should be evaluated further. However, until all these reforms are finalized and fully implemented, the full impact cannot be determined, though it would be desirable, as a matter of policy, to address some of the perceived negative impacts. Third, a holistic study of the RWA increases that could result from the most recent set of reforms is necessary. Fourth, the interactions among reforms will require additional attention to understand potentially competing incentives or countervailing impacts. This will become increasingly important as the reforms currently under revision are implemented. Finally, study of the impact of reforms across multiple jurisdictions would also be beneficial, as research to date has focused primarily on developed markets, especially the US and Europe.²²²

²²² BCBS (2016h)

APPENDIX A. SCOPE OF REGULATIONS COVERED BY THE REPORT

The post-crisis reforms, which are still running their course, introduced many complex rules governing capital, liquidity, trading operations, derivatives, and securitizations, and have already contributed to a dramatic strengthening of bank balance sheets globally.

A.1. BASEL III REFORMS

The table below summarizes the major themes of the Basel III regulations, which are discussed in rest of this section. Nevertheless, this is not an exhaustive list of all Basel reforms.

TABLE A.1: KEY COMPONENTS OF BASEL III

THEME	PHILOSOPHY	KEY COMPONENTS
Tier 1 capital	Stricter rules governing acceptable forms of capital to ensure banks are in a better position to absorb losses	- Minimum common equity requirement set at 4.5% in addition to Tier 1 ratio of 6% - Various deductions to common equity where capital is not deemed to be loss absorbing
Cyclicality	- Countercyclical framework to encourage the building of capital buffers - Forward-looking provisioning to transparently capture actual losses and reduce pro-cyclicality	- Capital conservation buffer of 2.5% added to common equity, and 0–2.5% countercyclical buffer on top of this depending on national circumstances - Expected Loss-based provisioning
Systemic risk	To reduce the probability and impact of failure of systemically important banks	Additional Common Equity Tier 1 (CET1) capital requirement for global systemically important banks (G-SIBs), ranging from 1% to 2.5%, depending on a bank's systemic importance (higher in some jurisdictions, e.g. US)
Counterparty credit risk coverage(CCR)	- Stricter capital requirements for counterparty credit risk exposures - Capital incentives to move “Over-the-counter” (OTC) derivative exposures to central counterparties	- Credit Valuation Adjustment (CVA) capital charge for mark to market credit losses - Increase of counterparty credit risk charges for trades with other financials - Use of stressed expected positive exposures (EPE) - New charges for wrong way risk - Capital incentives to move OTC derivative exposures to central counterparty (CCP)
Leverage	Aim to contain the build-up of excessive leverage, protect against gaming of risk-based requirements and help address model risk	- Initial 3% minimum Tier 1 capital/assets ratio (maximum leverage 33:1) - Basel II netting of derivatives allowed
Liquidity	Improved management and monitoring of banks – and system-wide liquidity risk	30-day Liquidity Coverage Ratio requirement - Net Stable Funding Ratio requirement - Common set of monitoring metrics to assist supervisors in identifying bank/system-wide trends

Sources: BIS (2016e), BCBS (2011a), BCBS (2015d), BIS (2016d), Oliver Wyman analysis

A.1.1. QUANTITY OF CAPITAL

The crisis revealed that many banks were undercapitalized, making it a priority to increase the quantity of capital. The minimum requirement for CET 1 was increased to 4.5% from 2%, and total Tier 1 was increased to 6% from 4%. The minimum requirement for total regulatory capital has not changed and kept at 8%.²²³

A capital conservation buffer (2.5%) and a countercyclical buffer (0 – 2.5%) were also established, and will be discussed below.

A.1.2. QUALITY OF CAPITAL

The failure of some forms of bank capital to absorb losses during the financial crisis revealed that the definition of capital under the existing capital framework was no longer adequate. Increasing the quality of capital, and not merely the quantity, was therefore seen as priority. In order to ensure that banks are in a better position to absorb losses on both a going-concern and gone-concern basis, Basel III redefined capital as follows:

- Tier 1 capital must help a bank to remain a going concern.
- Tier 2 capital must provide loss absorption on a gone-concern basis.

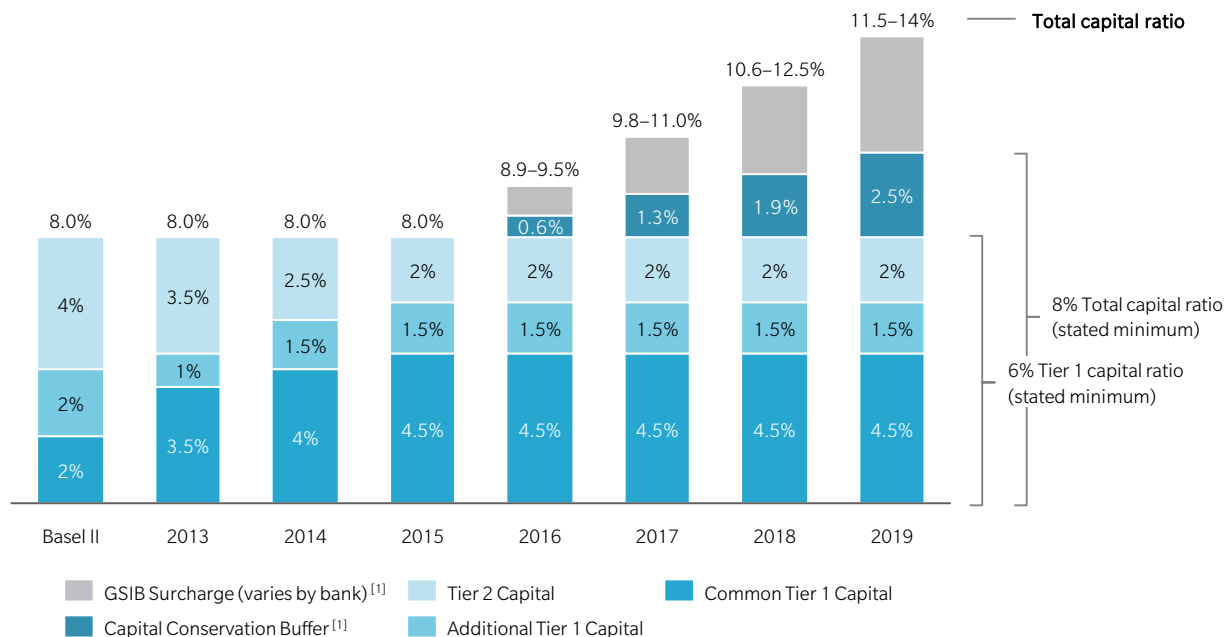
Tier 1 capital predominantly consists of common shares and retained earnings, Tier 2 is simplified to just one category and Tier 3 has been abolished to ensure that market risks are covered with the same quality of capital as credit and operational risks.²²⁴

The increase in capital requirements and the transition period are illustrated in the figure below. The countercyclical buffer is not shown in the figure as the calibration is dependent on circumstances. Similarly, other additional buffers may apply, such as buffers to meet stress testing requirements. The maximum G-SIB buffer shown below is the maximum US buffer.

²²³ BCBS (2011b)

²²⁴ Ibid

FIGURE A.1: BASEL III CAPITAL REQUIREMENTS



[1] GSIB surcharge and Capital Conservation Buffer are to be met with CET1 capital
 Source: BCBS (2013c)

A.1.3. REGULATORY BUFFERS

Basel III incorporates various counter-cyclical measures to ensure that banks prepare adequately during the benign parts of the cycle for the inevitable downturn(s) ahead. Basel III introduced two new capital buffers: a capital conservation buffer of 2.5% and a countercyclical buffer of 0–2.5% depending on the state of the economy.

CAPITAL CONSERVATION BUFFER

A capital conservation buffer above the regulatory minimum capital requirements has been incorporated in order to ensure that the banking sector as a whole adopts best practices on capital conservation. When a bank erodes its capital conservation buffer, limits are imposed on distributions (principally dividend payouts, share repurchases, discretionary Tier 1 payments and bonus payments to staff), allowing the bank to rebuild the buffer and strengthen its capital position. The capital conservation requirements will increase in severity as the bank continues to erode its buffer and its capital levels approach the minimum requirement.

Calibration for the capital conservation buffer has been set at 2.5% of risk-weighted assets (RWA), to be met with common equity after regulatory adjustments are applied. This raises Basel III's total CE requirement to 7% of RWAs.²²⁵

COUNTERCYCLICAL CAPITAL BUFFER

The purpose of the countercyclical capital buffer is to ensure that firms have a sufficient capital base, accumulated during periods of credit growth, to absorb losses in stressed periods. The countercyclical buffer rate is set by the competent authority in each jurisdiction.²²⁶ The size of the countercyclical capital buffer is to be defined as a

²²⁵ BCBS (2011b)

²²⁶ BCBS (2010d)

percentage of RWA and determined by regulators in each jurisdiction; the buffer may be expanded or reduced according to credit exposure levels.

The countercyclical capital buffer will be calibrated within a range of 0–2.5%, to be met by common equity or other fully loss absorbing capital.²²⁷

In practice, many banks have developed additional buffers to avoid being restricted in their capital management decisions.

G-SIB SURCHARGE

The global systemically important banks (G-SIBs) surcharge intends to capture the “cross-border negative externalities created by G-SIBs” that are not fully addressed by the other regulatory frameworks. These negative externalities stem from the role of G-SIBs in the global financial system and their potential to cause system-wide impacts that these institutions may not fully account for when making cost-benefit optimizing choices. Moreover, “the moral hazard costs associated with implicit guarantees derived from the perceived expectation of government support may amplify risk-taking, reduce market discipline and create competitive distortions, and further increase the probability of distress in the future.” Thus, a surcharge calculated based on size, interconnectedness, lack of readily available substitutes, and global scope is added to the capital requirements for G-SIBs in order to reduce the probability and the impact of their failure.²²⁸

A.1.4. COUNTERPARTY CREDIT RISK CAPITAL REQUIREMENTS

Counterparty credit risk was identified as an area with insufficient capital. As individual financial institutions (e.g. Lehman Brothers) began to fail, counterparty exposures caused a ripple through the industry as losses on those exposures were taken by other banks. In other cases (e.g. AIG), the counterparty credit exposures were a key rationale for government assistance, to avoid catastrophic, industry-wide contagion. Post-crisis Basel Committee initiatives add more stringent requirements for measuring counterparty exposures; capital incentives for banks to use central counterparties for derivatives; and higher capital for inter-financial sector exposures.

BCBS has released guidance that aims to establish a capital treatment that ensures banks’ exposures to central counterparties are adequately capitalized. Most notably, the final standard on capital requirements for bank exposures to central counterparties include a “single approach for calculating capital requirements for a bank’s exposure that arises from its contributions to the mutualized default fund of a qualifying CCP (QCCP), [employ] the standardized approach for counterparty credit risk (as opposed to the Current Exposure Method) to measure the hypothetical capital requirement of a CCP, and [include] an explicit cap on the capital charges applicable to a bank’s exposures to a QCCP.” BCBS established these standards based on its work in consultation with the Committee on Payments and Settlement Systems (CPSS) and the International Organization of Securities Commissions (IOSCO).²²⁹

STANDARDIZED APPROACH FOR MEASURING COUNTERPARTY CREDIT RISK EXPOSURES

The standardized approach for measuring counterparty credit risk exposures (SA-CCR) was established by BCBS to address several limitations in the Current Exposure Method (CEM) and the Standardized Method (SM) for measuring counterparty credit risk. The objectives of guidance released by BCBS are to devise an approach suitable for application to a wide variety of derivatives transactions (margined, un-margined, bilateral, cleared), to minimize discretion used by national authorities and banks, and to improve the risk sensitivity of the capital

²²⁷ BCBS (2011b), BIS (2016i)

²²⁸ BCBS (2013g)

²²⁹ BCBS (2014e)

framework without creating undue complexity. SA-CCR applies to Over the Counter (OTC) derivatives, exchange-traded derivatives and long settlement transactions.²³⁰

MARGIN REQUIREMENTS FOR NON-CENTRALLY CLEARED DERIVATIVES

The BCBS aims to reduce systemic risk by imposing a margin requirement for non-centrally cleared derivatives.²³¹ Additionally, the framework has been designed to “reduce systemic risks related to OTC derivatives markets, as well as to provide firms with appropriate incentives for central clearing while managing the overall liquidity impact of the requirements”.²³²

A.1.5. LEVERAGE RATIO

The leverage ratio – the ratio of high quality capital to assets – is intended to be a simple, transparent, non-risk based measure that is calibrated to act as a credible supplementary measure to the risk based requirements of Basel III.

Using the new definition of Tier 1 capital (after regulatory adjustments) as the relevant capital measure, a minimum 3% ratio of Tier 1 capital to exposure (gross assets plus off balance sheet exposures and derivatives) has been proposed for a “parallel run” period from January 2013 to January 2017, and will be subject to testing and studies relative to risk-based requirements.

In calculating the exposure measure, all assets are to be included using the accounting balance sheet. Repo style transactions will be included according to the accounting measure of exposure, netted as in Basel II. All derivatives (including credit derivatives) will be netted as in Basel II and measured using a modified version of the SA-CCR.²³³

The process of calibration of the leverage ratio is ongoing prior to rules becoming binding in 2018. The comments on the revisions to the Basel III leverage ratio framework will be due in July 2016.

A.1.6. LIQUIDITY PROPOSALS

Liquidity was a key missing element from the earlier Basel accords. While regulators and banks were aware of this, the crisis highlighted the urgent need for liquidity standards as liquidity issues led to the failure or rescue of various financial institutions during the crisis. In order to raise the resilience of banks to potential short-term and long-term liquidity shocks, two new standards have been established for liquidity risk supervision for internationally active banks: the Liquidity Coverage Ratio,²³⁴ a short-term measure of liquidity calculated under a specified acute stress scenario, and the Net Stable Funding Ratio, a longer-term complement that addresses structural liquidity mismatches. The BCBS has published the final standards for both Liquidity Coverage Ratio and Net Stable Funding Ratio rules.²³⁵

LIQUIDITY COVERAGE RATIO (LCR)

The Liquidity Coverage Ratio (LCR) is defined as the ratio of an institution’s stock of unencumbered, high quality liquid assets (HQLA) to net cash outflows over a 30-day stress period.

For an asset to qualify as part of the stock of HQLA it must be unencumbered, freely available to the consolidated (parent) entity in times of stress, and ideally, central bank eligible. The asset must also satisfy a set of fundamental

²³⁰ BCBS (2014j)

²³¹ BCBS and IOSCO (2013)

²³² BIS (2016f)

²³³ BCBS (2014b), BCBS (2016d), BCBS (2016f)

²³⁴ BCBS (2013d), BCBS (2014g)

²³⁵ BCBS (2014d), BCBS (2013d)

and market-related characteristics for liquidity and be available to be converted into cash in the currency and jurisdiction where liquidity is required in the event of stress.

Net cash outflows in the denominator of the LCR are cumulative cash outflows net of cumulative cash inflows (capped at 75% of outflows) during the specified stress period. Calculating the cumulative cash outflows consists of two parts: the outstanding balances of various types of liabilities are multiplied by specified percentages that are expected to run off and various off-balance sheet commitments are multiplied by specified draw-down amounts. Contractual cash inflows are also included for fully performing retail, wholesale and reverse repos secured by illiquid assets.

NET STABLE FUNDING RATIO (NSFR)

As part of Basel III, the net stable funding ratio (NSFR) is a new liquidity requirement that aims to reduce liquidity mismatches and maturity transformation risk. The NSFR is designed to reduce the “the likelihood that disruptions to a bank’s regular sources of funding will erode its liquidity position in a way that could increase the risk of its failure and potentially lead to broader systemic stress”.²³⁶

The NSFR is defined to be the ratio of the Available Stable Funding (ASF) to the Required Stable Funding (RSF). ASF is broadly defined as the portion of capital and liabilities expected to be reliable over a one-year time horizon. RSF is defined as the amount of stable funding required based on an institution’s liquidity risk profile of assets and exposures.²³⁷

The ASF and RSF are calculated by first classifying the carrying value of an institution’s equity and liabilities into categories, then applying relevant weights (called “factors”) and finally taking the sum of the weighted amounts.

A.1.7. MEASURING AND CONTROLLING LARGE EXPOSURES

The BCBS has published a framework for measuring and controlling large exposures in April 2014. The framework “protects banks from significant losses caused by the sudden default of an individual counterparty or a group of connected counterparties” and is designed so “that the maximum possible loss a bank could incur if such a default were to occur would not endanger the bank’s survival as a going concern.” The final version of the framework extends the coverage to exposures to funds, securitization structures and collective investment undertakings, thereby “strengthening the oversight and regulation of the shadow banking system.”²³⁸

A.2. ONGOING BASEL REFORMS

Additionally, there are a number of other ongoing Basel workstreams that are discussed within the scope of this document.

A.2.1. INTEREST RATE RISK IN THE BANKING BOOK (IRRBB)

The BCBS aims to help ensure that banks have appropriate capital to cover potential losses from exposures to changes in interest rates and to reduce capital arbitrage between the trading book and banking book. The updated standard uses an enhanced Pillar 2 framework, expands the guidance on a bank’s IRRBB management process, enhances disclosure requirements to promote greater consistency, transparency, and comparability, and updates the standardized framework.²³⁹

²³⁶ BCBS (2014d), BIS (2016c)

²³⁷ BCBS (2014d)

²³⁸ BIS (2014), BCBS (2014m)

²³⁹ BCBS (2015b), BCBS (2016i)

A.2.2. STANDARDIZED APPROACH FOR CREDIT RISK

The standardized approach for credit risk has been updated as part of a review of capital framework “in order to balance simplicity and risk sensitivity and to promote comparability by reducing variability in risk-weighted assets across banks and jurisdictions.” A set of proposed changes was published on December 2014, which notably suggested removal of external ratings from risk-weight calculation and instead assigned risk weights based on alternative risk drivers. Based on comments and further development of the revisions, a second consultative document was published on December 2015. This document proposed revisions to the standardized approach which include the reintroduction of external ratings for exposures to banks and corporates, in a non-mechanistic manner. Additionally, the revised proposal included alternative approaches for jurisdictions that, for regulatory purposes, do not allow the use of external rating. The revised approach will be an important determinant of capital requirements given its likely use as a floor underpinning the Advanced Internal Ratings Based (IRB) approach for credit risk. The comments on the second consultative document were due in March 2016, and a final standard is anticipated.²⁴⁰

A.2.3. FUNDAMENTAL REVIEW OF THE TRADING BOOK (FRTB)

Basel 2.5 was put in place as a quick response to a perception that capital requirements for trading book assets had been far too low under Basel II. However, the Basel Committee believed a Fundamental Review of the Trading Book was necessary to truly tackle the issues appropriately for the long run. The FRTB has produced the Revised Standards for Minimum Capital Requirements for Market Risk. This reflects BCBS’s final changes to the market risk capital framework. The revised framework aims to further reduce incentives for arbitrage between the regulatory banking and trading books through a revised boundary, and revises the internal and standardized model approaches.²⁴¹

A.2.4. OPERATIONAL RISK

In March 2016, the Basel Committee proposed revisions to the standardized approach for measuring operational risk capital as a part of its review of the Basel III framework. In addition to streamlining the framework, the new approach will address weaknesses identified in the existing approach: the Advanced Measurement Approach (AMA). The Committee has proposed to remove the Advanced Measurement Approach (AMA) due to its “inherent complexity, and the lack of comparability arising from a wide range of internal modelling practices.” The new framework will be based on a non-model-based method for the estimation of operational risk capital: the Standardized Measurement Approach (SMA). This framework “builds on the simplicity and comparability of a standardized approach, and embodies the risk sensitivity of an advanced approach.” The comments on the consultative document will be due in June 2016, and a final standard is anticipated thereafter.²⁴²

A.2.5. REDUCING VARIATION IN CREDIT RISK-WEIGHTED ASSETS – CONSTRAINTS ON THE USE OF INTERNAL MODEL APPROACHES

In March 2016 the Basel Committee issued a consultative document that outlined its proposed changes to the advanced internal ratings-based (IRB) approach and the foundation IRB approach. The proposal includes a number measures that aim to “(i) reduce the complexity of the regulatory framework and improve comparability; and (ii) address excessive variability in the capital requirements for credit risk.” Specifically, the Basel Committee proposed to “remove the option to use the IRB approaches for certain exposures, where it is judged that the model parameters cannot be estimated sufficiently reliably for regulatory capital purposes; adopt exposure-level, model-parameter floors to ensure a minimum level of conservatism for portfolios where the IRB approaches remain

²⁴⁰ BCBS (2015k)

²⁴¹ BCBS (2016g)

²⁴² BCBS (2016b), BIS (2016h)

available; and provide greater specification of parameter estimation practices to reduce variability in risk-weighted assets (RWA) for portfolios where the IRB approaches remain available.” The design of this proposal is intended to complement BCBS’ proposal on capital floors. The calibration of this proposal is ongoing at the time of drafting of this report and will be informed by a comprehensive quantitative impact study and “by the Committee’s aim to not significantly increase overall capital requirements.”²⁴³

A.2.6. CAPITAL FLOORS

Capital floors have been established to “ensure that the level of capital across the banking system does not fall below a certain level; mitigate model risk and measurement error stemming from internally modelled approaches; address incentive-compatibility issues; and enhance the comparability of capital outcomes across banks.” In December 2014, the Committee published a consultative document that outlined a revised framework for the capital floor that is proposed to replace the current transitional floor, which is based on the Basel I standard. The revised framework calls for banks using the internal ratings based (IRB) approach to maintain a certain percentage of capital that they would if they had used the standardized approach. Importantly, the calibration of the capital floor was not finalized as a part of the December 2014 standards. BCBS has stated that it will “consider the calibration of the floor alongside its work on finalizing the revised standardized approaches to credit risk, market risk and operational risk, and its ongoing review of the capital framework and its balance of simplicity, comparability and risk sensitivity.” The comments on the consultative documents were due in March 2015, and a final standard is anticipated.²⁴⁴

A.2.7. SECURITIZATION

The 2008 financial crisis brought to light several weaknesses in the Basel II securitization framework, including mechanistic reliance on external ratings, lack of risk sensitivity, cliff effects and insufficient capital for certain exposures. BCBS has revised the framework by 1) simplifying the hierarchy of approaches and reducing reliance on external ratings; 2) introducing and revising the risk drivers used in each approach; 3) enhancing the framework’s calibration, by changing the amount of regulatory capital banks must hold for exposures to securitizations and 4) revising the criteria for identifying simple, transparent and comparable securitizations.²⁴⁵ The final framework document was issued in July 2016.

A.2.8. HAIRCUT FLOORS FOR SECURITIES FINANCING TRANSACTIONS

In order “to strengthen oversight and regulation of shadow banking”, BCBS seeks to set “significantly higher capital requirements for transactions with haircuts traded below the haircut floors” for non-centrally cleared securities financing transactions. The goal is to “create incentives for banks to set their collateral haircuts above the floors rather than hold more capital.” The comments on the recently issued consultative document (“Haircut floors for non-centrally cleared securities financing transactions”) were due in January 2016.²⁴⁶

²⁴³ BCBS (2016c)

²⁴⁴ BCBS (2014f)

²⁴⁵ BCBS (2014a), BCBS (2015a)

²⁴⁶ BCBS (2015n)

A.2.9. STEP-IN RISK

The BCBS has issued a proposed framework intended to address the risk that a bank will be required to provide financial support to an entity beyond, or in the absence of, its contractual obligations should the entity experience financial stress (e.g. a risk that a bank may provide financial support to another entity to which it has capital ties, sponsorship, and decision-making or operational input.) The intent of the guidance is to develop an approach for identifying, assessing and addressing step-in risk.²⁴⁷ The comments on the previously issued consultative document were due in March 2016.

A.2.10. STRESS TESTING

Stress testing has been implemented in multiple jurisdictions (such as the Comprehensive Capital Analysis and Review (CCAR) and the Dodd-Frank Act Stress Test (DFAST) mandated by the Federal Reserve in the US, European Banking Authority's stress tests in Europe, and Bank of England's stress tests in the UK) to ensure that systemically important banks are adequately capitalized to sustain operations during a stress period. Stress testing is now viewed as a central part of the capital adequacy assessment in the US and Europe. Stress tests have the capacity to impose higher capital charges upon banks that otherwise satisfy solvency requirements of standard capital, liquidity, and leverage ratios, and they have emerged as the binding regulatory constraint for many of the largest global banks, thus further increasing capital requirements.²⁴⁸

A.2.11. TOTAL LOSS-ABSORBING CAPACITY (TLAC)²⁴⁹

We have included one rule from outside the Basel Committee's direct work within our scope given its close connection with the Basel capital and liquidity rules. TLAC has been established in order to ensure that "sufficient loss-absorbing and recapitalization capacity available in resolution to implement an orderly resolution that minimizes any impact on financial stability, ensures the continuity of critical functions, and avoids exposing taxpayers (that is, public funds) to loss with a high degree of confidence." In addition, it is intended to reduce the perception that systemically important banks are "too big to fail", so that these firms will be incentivized to discipline risk-taking and to reduce outsized growth. TLAC requirements are set at the firm level and include a minimum "external TLAC which applies at each resolution entity within a G-SIB group and requirements for internal TLAC in the form of intra-group liabilities to certain subsidiaries in the group." The intent of internal TLAC requirements is to enable "effective cross-border resolution strategies by ensuring an appropriate distribution of loss absorbing capacity within the group" and to ensure that losses can be transferred from the subsidiary to the resolution entity in the event of resolution. Internal TLAC "should be between 75% and 90% of the minimum external TLAC requirement that would apply to the material sub-group if it were a resolution entity." Breaches to the TLAC minimum should be treated as severely as a breach of minimum capital requirements. Final compliance for the FSB guidance is required by 2022, with interim requirements by 2019.²⁵⁰

In November 2015, the Basel Committee published a consultative document to specify the treatment of bank deductions "from their regulatory capital [of their] holdings of TLAC instruments, subject to thresholds." This is intended to discourage banks from holding TLAC instruments in other banks. The document proposed that internationally active G-SIBs and non-G-SIBs deduct net TLAC holdings from their Tier 2 capital. Additionally, the consultative document proposed that CET1 used to meet the TLAC minimum "may not be used to meet Basel III regulatory buffers." The comments on the consultative document were due in February 2016, and a revised consultative document is anticipated.²⁵¹

²⁴⁷ BCBS (2015h), Christie and Glover (2015)

²⁴⁸ BCBS (2009b), Board of Governors of the Federal Reserve System (2016), EBA (2016a), Bank of England (2015c)

²⁴⁹ TLAC is a joint initiative between the Basel Committee and FSB

²⁵⁰ FSB (2015), AFME (2015)

²⁵¹ BCBS (2015c)

A.2.12. COVERAGE OF RISK TYPES

Basel III reforms have been developed to address a wide spectrum of risk types. The coverage of risk types by reforms to date is illustrated in the table below.

TABLE A.2: POST-CRISIS REFORMS/PROPOSALS: PRIMARY COVERAGE OF RISK TYPES

	RISK TYPE						
	Credit	Counter-party credit	Capital markets	Derivatives and securitization	Operational	Liquidity	Other
Capital							
Basel III	✓	✓	✓	✓	✓	✓	✓
CCB	✓					✓	
CCP Exposure	✓	✓	✓	✓			
Counterparty Credit Risk	✓	✓	✓	✓			
Securitization				✓			
IRRBB	✓		✓			✓	
FRTB			✓	✓			
CVA	✓	✓	✓	✓			
Step-in risk					✓	✓	✓
TLAC							✓
Op Risk					✓		
Leverage ratio	✓	✓	✓	✓		✓	✓
Liquidity							
LCR	✓		✓	✓		✓	
NSFR			✓	✓		✓	
Other							
Margin req's		✓	✓	✓		✓	
Stress testing	✓	✓	✓	✓	✓	✓	✓
Resolution planning	✓	✓	✓	✓	✓	✓	✓

Source: BCBS consultative documents, Oliver Wyman analysis

A.2.13. IMPLEMENTATION STATUS

Implementation of Basel III reforms commenced in 2013. However the implementation timelines and deadlines are outstanding for a number of proposed reforms which have not yet been finalized (e.g. standardized measurement approach for operational risk) or which have built-in transition periods. The figure below illustrates the implementation timeline for key reforms for which the timeline has been released.

FIGURE A.2: BCBS AND FSB POST-CRISIS REFORMS IMPLEMENTATION TIMELINE

	2013	2014	2015	2016	2017	2018	2019	2020
Capital								
Basel III								
CCyB								
CCP Exposure								
Counterparty credit risk ^[1]								
GSIB surcharge ^[2]								
FRTB ^[3]								
IRRBB								
TLAC								
Liquidity								
LCR								
NSFR								
Leverage ratio ^[4]								
Margin requirements								

[1] Final standard will apply on 1 Jan. 2017. Until then, interim rules issued in July 2012 are in effect

[2] Requirements will be introduced between 1 January 2016 and year end 2018 and will become fully effective on 1 January 2019

[3] Final rules for the market risk framework will be implemented by 1 Jan. 2019. Regulatory reporting by banks based on the revised framework are due by 31 Dec 2019

[4] The parallel run period began 1 Jan. 2013, public disclosure requirements were effective as of 1 Jan. 2015, and final calibration of Basel III leverage ratio is planned for implementation by 1 Jan. 2018

Source: BCBS (2011b); BCBS (2015m); BCBS (2014e); BCBS (2016g); BCBS (2016i); BCBS (2015c); BCBS (2013d); BCBS (2014d). BCBS (2016d); BCBS and IOSCO (2015)

A.2.14. ONGOING AND FUTURE WORK

The Basel Committee is expected to continue to finalize the remaining post-crisis reform initiatives. BCBS's current agenda²⁵² is focused on four core workstreams, as outlined below.

POLICY DEVELOPMENT

BCBS aims to "continue to pursue its post-crisis reform agenda, with a focus on restoring confidence in capital ratios." BCBS will address three policy related issues: First, BCBS will be assessing interaction, coherence and overall calibration of reform policies. BCBS will consider "how the various regulatory metrics interact and whether the calibration and design of the various elements of the framework are consistent with their intended objectives." Second, BCBS will be reviewing the regulatory treatment of sovereign risk and considering policy options. Third, BCBS will investigate the role of stress testing in relation to the current Basel III Pillar 1 (minimum requirements) regulatory framework. This work is driven by "the increasing importance of stress testing in many countries, both as a supervisory tool and as a method for determining bank capital requirements."

SIMPLICITY, COMPARABILITY AND RISK SENSITIVITY

BCBS's work on simplicity, comparability, and risk sensitivity "combines the issues emerging from the Committee's top-down review of the framework along with the bottom up work on risk-weighted asset variability, which were detailed in the Committee's November 2014 report to the G20 Leaders." BCBS will be working on ensuring balance between simplicity, comparability and risk sensitivity across regulatory framework.

MONITORING AND ASSESSING IMPLEMENTATION

BCBS will continue to leverage its Regulatory Consistency Assessment Programme (RCAP) to evaluate member jurisdiction's implementation of its proposed standards. The scope of RCAP will "be expanded to also cover Basel III's liquidity standards and the frameworks for global and domestic systemically important banks."

IMPROVING THE EFFECTIVENESS OF SUPERVISION

BCBS will focus on improving the effectiveness of its supervision. In particular, "the Committee will focus on supervisory practices related to stress testing, valuation practices and the role of Pillar 2 in the capital framework."

²⁵² Information on Basel Committee's ongoing workstreams is available at BIS (2016g)

APPENDIX B. SUMMARY OF KEY STUDIES

B.1. SUMMARY OF KEY STUDIES MEASURING IMPACT OF REGULATORY REFORM ON LENDING AND CAPITAL MARKETS

STUDY	FOCUS OF STUDY	COVERAGE OF BASEL REFORMS								COVERAGE OF NATIONAL REFORMS ²⁵³			ACCOUNTS FOR OFFSETS/ INTERACTIONS OF REFORMS	SAMPLE	APPROACH
		Basel capital	Leverage ratio	Liquidity (LCR)	Liquidity (NSFR)	Liquidity (total)	TLAC	Other Basel reforms	Unspecified	Capital regulations	Liquidity regulations	Other/multi-regulation			
Aiyar, Calomiris and Wieladek (2014)	Cost	✓								✓			No	UK	Panel regression, VAR
Baker & Wurgler (2015)	Cost	✓											No	US	Regression
BIS – LEI (2010) ²⁵⁴	Cost and benefit	✓			✓								Yes	OECD	Uses member models
MAG (2010b) – BIS (Interim)	Cost	✓				✓							No	OECD	Uses member models
MAG (2010a) – BIS	Cost	✓											No	OECD	Uses member models
Bridges et al (2014)	Cost									✓			No	UK	Panel regressions
Cosimano and Hakura (2011)	Cost	✓											No	OECD	GMM estimation
De-Ramon et al (2012)	Cost and benefit	✓	✓			✓							Unknown	UK	NIGEM model
ECB (2015)	Cost and benefit											✓	Unknown	Europe	Fixed-effect panel regression, DSGE
Elliott (2015)	Cost	✓	✓	✓	✓			✓					Yes	Global	NA
Elliott, Salloy, and Santos (2012)	Cost	✓		✓	✓			✓				✓	Yes	US	Long-term steady-state analysis of a lending formula
Fraisse et al (2015)	Cost	✓											No	France	Regression s
Francis and Osborne (2009a)	Cost									✓			No	UK	General Method of Moments (GMM)
GFMA, IIF and PwC (2015)	Cost	✓	✓	✓	✓		✓	✓				✓	Yes	Global	NA
IMF (2015a)	Cost								✓				Not specified	Global	NA
IMF (2015b)	Cost								✓				Not specified	Global	NA
IMF (2016)	Cost								✓				Not specified	Global	NA

²⁵³ National regulations are implementations of Basel reforms

²⁵⁴ Cited in the bibliography as BCBS (2010a)

STUDY	FOCUS OF STUDY	COVERAGE OF BASEL REFORMS								COVERAGE OF NATIONAL REFORMS ²⁵³			ACCOUNTS FOR OFFSETS/ INTERACTIONS OF REFORMS	SAMPLE	APPROACH
		Basel capital	Leverage ratio	Liquidity (LCR)	Liquidity (NSFR)	Liquidity (total)	TLAC	Other Basel reforms	Unspecified	Capital regulations	Liquidity regulations	Other/multi-regulation			
Kashyap et al. (2010)	Cost	✓											No	US	Reduced-form model and model calibration approach
King (2010)	Cost	✓			✓								Yes	OECD	Balance sheet modeling
Meeks (2014)	Cost									✓			No	UK	Monetary vector auto regression (VAR)
Mendicino et al (2015) ²	Cost and benefit	✓											No	Europe	DSGE
Mesonnier and Monks (2014)	Cost									✓			No	Europe	Regression
Mizrach (2015)	Cost								✓				Not specified	US	NA
Noss and Toffano (2014)	Cost									✓			No	UK	Reduced-form models
Oliver Wyman and Morgan Stanley (2015)	Cost	✓	✓	✓	✓			✓					Yes	Global	NA
Roger & Vlcek (2011)	Cost	✓				✓							Yes	US and Europe	DSGE
Schanz et al (2011)	Cost and benefit	✓											Yes	UK	Balance sheet modeling
Slovik and Courneade (2011)	Cost	✓											No	OECD	Accounting
Sutorova and Teply (2013)	Cost	✓								✓			No	Europe	Simultaneous equations model
Gambacorta and Shin (2016)	Cost	✓											Yes	OECD	OLS, GMM

B.2. DETAILED DESCRIPTION OF STUDIES ON THE IMPACT OF REFORMS ON THE LENDING CHANNEL

IMPACT ON LOAN RATES

The majority of the academic research to date has been focused on estimating the impact of only the capital reforms. However, there are some studies that address the comprehensive impact of reforms. The results of these studies are discussed first. Studies conducted by the Basel Committee and Bank for International Settlements are discussed first, following by studies conducted by other multilateral bodies, followed by studies conducted by national and Europe-wide regulators (ECB and FSA). The impacts discussed below reflect the baseline impact estimate without additional RWA inflation.

The first study that addresses the comprehensive impact of reforms is BIS's LEI (2010),²⁵⁵ one of the major studies released by the BCBS and its sister bodies. It provides an analysis of the long-term economic impact (LEI) of the Basel Committee's proposed capital and liquidity reforms, focusing on their impact on output. Utilizing member nation models, and adjusting for our baseline and target capital ratios, the LEI results imply an 69 basis point increase in the US, a 63 basis point increase in Europe, and an 71 basis point increase in Japan due to an increase in total common equity to risk-weighted assets. Second, the additional cost of meeting the liquidity standard amounts are estimated to be 25 basis points in lending spreads when risk-weighted assets (RWA) are left unchanged. The study considers an additional offset taking account of the fall in RWA as a result of complying with the liquidity requirements and the resulting lower regulatory capital needs. This offset is discussed in Section 1 on the lending channel. LEI (2010),²⁵⁶ like many other studies, assumes a full pass-through of costs to the customer. To estimate the impacts of liquidity reforms, it examines primarily the effects of the NSFR and not the LCR, though its methodology likely captures most effects of reforms. However, the effects of liquidity reforms may not be fully captured.²⁵⁷

The MAG (2010) is a BIS Basel Committee on Banking Supervision and FSB study that evaluates the transitional impact of increased capital requirements. As in the LEI,²⁵⁸ the MAG utilizes member models to understand impacts of reforms for an "average" economy. The final version of the MAG report produced findings, adjusted for our baseline and target capital ratios, that imply a 65 basis point increase in the lending rates in the US, a 60 basis point increase in the lending rates in Europe, and 66 basis point increase in lending rates in Japan following an increase in the equity to RWA ratio. The MAG also released an interim study that showed a somewhat different estimate of impacts, primarily driven by the fact that effects are shown over a different time horizon (35 and 48 quarters in the final report, vs. 18 and 32 quarters in the interim report). The interim report findings imply a 81 basis point increase in lending rates in the US, 75 basis point increase in lending rates in Europe, and a 83 basis point increase in Japan by the end of the simulation when reforms are implemented in two years. Additionally, the interim study estimates a 15 basis point increase in lending rates due to a 25% increase in liquidity requirements by the end of the simulation when reforms are implemented in two years. The MAG estimates focus on shorter-term impacts than most other studies discussed which accounts for much of the magnitude of the findings. In order to make estimates more comparable to the other studies discussed in the report, the longer-term estimate is selected (the end of the simulation period). The MAG analysis relies on models developed by member nations, and as such rests on a large number of varying assumptions.²⁵⁹

²⁵⁵ Cited in the bibliography as BCBS (2010a)

²⁵⁶ Cited in the bibliographies as BCBS (2010a)

²⁵⁷ BCBS (2010a), Elliott, Salloy and Santos (2012)

²⁵⁸ Cited in the bibliography as BCBS (2010a)

²⁵⁹ MAG (2010a), MAG (2010b)

King (2010) is a BIS Working Paper that examines the impact of increases in capital and liquidity requirements proposed under Basel III on bank lending spreads. King uses a balance sheet modeling approach to evaluate the impacts of a representative bank's capital ratio being raised by increments of 1 percentage point in capital requirements. The King study points to an increase in 80 basis points in the US, 73 basis points in Europe, and 81 basis points in Japan due to the increase in capital requirements (using our projected total increase). King's study also points to a 24 basis point increase due to liquidity requirements when RWA are left unchanged. King, too, assumes that the costs of capital reforms are fully passed through to the end users. Like the LEI²⁶⁰, King calculates an offset taking account of the fall in RWA and the resulting lower regulatory capital needs. This offset and the underlying assumptions are discussed in Section 1 on the lending channel.

Elliott, Salloy, and Santos (2012) evaluate the impact of Basel III capital and liquidity requirements, derivatives reforms, and higher taxes and fees on lending rates. The authors use a long-term steady-state analysis of a lending formula to estimate the impact of multiple components of the total impact of Basel reforms. Their estimates are as follows, adjusted for our baseline and target capital ratios:

TABLE B.3: ESTIMATES OF GROSS IMPACTS OF REFORMS FOUND BY ELLIOTT, SALLOY, AND SANTOS (2012)

	EUROPE	JAPAN	US
Capital	32	21	64
LCR	8	1	11
NSFR	10	11	16
Derivatives	1	0	3
Taxes and Fees	6	0	4
Total	57	33	98

Unlike many other studies, Elliott, Salloy, and Santos (2012) do not assume a 100% pass through of the costs to the end user from the capital increase: they assume a 50% pass-through, based on a modified version of the Modigliani-Miller theorem, which decreases the overall impact (this is discussed further in Section 1). However, the figures above do not reflect this adjustment, as we wish to discuss all offsets together in Section 1. Elliott, Salloy, and Santos (2012) make a number of other assumptions such as the baseline level of capital ratios and target ratios that impact the size of the overall estimate of the reforms.²⁶¹

In another IMF study, Roger and Vlcek (2011) assess the medium-term macroeconomic costs of increasing capital and liquidity requirements. They use a dynamic stochastic general equilibrium (DSGE) model to estimate the impact of a 2 percentage point increase in the equity-to-RWA ratio and an increase in liquidity requirements. They distinguish their results between peak and long-run impacts, where the peak estimates are significantly higher. In the long run, their estimates suggest that capital requirements will increase lending spreads by 53 basis points in US, and 37 basis points in Europe, using our baseline and target capital assumptions. They also estimate that liquidity requirements will increase lending spreads by 20 basis points in the US and 5 basis points in Europe in the long-run. Roger and Vlcek assume a pass-through of the costs and expect monetary policy to respond to regulatory change.

De-Ramon et al (2012) measure the impact of prudential policy on the macroeconomy in the UK. Leveraging the NiGEM model, De-Ramon et al suggest that the lending wedge for the UK economy increases by 67 basis points as a result of full adjustment to Basel III requirements. The study also finds that the shorter term impact on the corporate lending wedge is much higher: lending rates increase by 126 basis points before slowly declining to the long-run average of 67 basis points. Household borrowing costs, on the other hand, increase continuously over the

²⁶⁰ Cited in the bibliography as BCBS (2010a)

²⁶¹ Ibid

study period. While the authors provide a cumulative estimate of the overall impact of reforms, they do not provide sufficient detail for the authors of this report to scale the impact to the “gap to target” estimates provided above. As such, the cumulative estimate provided by De-Ramon et al is used as the cumulative impact of the analysis. Like many other studies, De-Ramon et al assume that the M-M proposition does not hold in full. They also assume that banks maintain the existing level of voluntary capital buffers above the minimum requirements, and as such an increase in the minimum capital ratios translates to a one-to-one increase in individual banks’ holdings. This may overestimate the impact of reforms in this analysis, as banks may lower their buffers given an increase in the regulatory minimums. Additionally, the authors assume that the structural parameters of the economy estimated from the historical period do not change.

The ECB (2015) analysis evaluates the impact of the proposed European CRR and CRD IV reforms on bank financing in Europe. Using fixed-effects panel regressions and DSGE, this study finds that the introduction of the aforementioned reforms contributed to a 0–15 basis points increase in lending rates across different loan products, where the average increase for households and firms combined amounted to 9 basis points. This study provides an evaluation of a regional implementation of reforms, but the impact captured by it is highly specific to the European region and the implementation approach. Additionally, the study is not fully transparent about the underlying assumptions, which makes it difficult to compare it to peer estimates.

Gambacorta and Shin (2016) evaluate the impact of 1 percentage point increase in ratio of equity-to-total assets on cost of debt financing, and consequently the cost of funding using OLS regression and GMM. They find that a 1% increase in equity to total assets ratio leads to a 3 basis point increase in cost of funding. The estimate is smaller than other estimates discussed above as the study calculates a significant reduction in the cost of debt resulting in approximately a 50% Modigliani-Miller offset, not taking account of the tax benefit of debt (which would lower the offset) or the reduction in required return on equity (which would raise the offset).

IIF (2011) is another study assessing the impact of multiple reforms on the lending channel. Like the ECB (2015), the IIF study evaluates the impact of Basel reforms, including the jurisdictional variations in implementation. The impacts found by the IIF study were significantly higher than all other peer estimates: In the US, they find a 243 basis point increase in lending rates for 2011–2020 and a 468 basis point increase in lending rates for 2011–2015. In Europe they find a 328 basis point increase in lending rates for 2011–2020 and a 291 basis point increase in lending rates for 2011–2015. In Japan they find a 181 basis point increase in lending rates for 2011–2020 and a 202 basis point increase in lending rates for 2011–2015. The findings of the study evaluate the impact of many more reforms than other peer studies: for example, they include considerations of other reforms specific to each jurisdiction, such as ring-fencing in the UK. Additionally, the significantly larger estimates are also driven by a number of assumptions. First, the IIF baselines are more similar to the levels of safety margins held by financial institutions pre-crisis than following the market movement towards holding more capital in light of the lessons learned from the financial crisis, which suggests a larger “gap to target” than is likely. Second, the study assumes that the expected return demanded by investors is heavily impacted by the overall volume of securities being issued, which appears to be a significant driver of the results. Given these differences, this study is not included in our graphical comparison or other analysis.²⁶²

In addition to the studies described above, a number of other official and academic studies focus specifically on the impact of capital requirements on loan rates. We first discuss official studies on the subject, and then turn to academic studies.

Cosimano and Hakura (2011) evaluate the impact of the new capital requirements introduced under the Basel III framework on bank lending rates and loan growth. Using a generalized method of moments approach based on OECD country data, the authors’ findings imply an increase of 51 basis points in the US, 25 basis points in Europe, and 29 basis points in Japan due to increases in capital requirements (using our projected total increase). The

²⁶² IIF (2011), Elliott, Salloy, and Santos (2012)

authors also find that banks in countries that did not experience the recent financial crisis are less impacted than those that did experience the banking crisis. The authors of this study also assume that the M-M proposition does not hold and that costs will be passed through to customers. They also assume that loan demand declines as loan rates go up, which impacts their estimate of loan volume decline (discussed in a subsequent section).

Schanz et al (2011) develop a framework for assessing long-term costs and benefits of increasing capital requirements for the overall economy based on UK data. Using a balance sheet modeling technique, they find a 36 basis point increase in lending rates due to a 1% rise in capital to risk-weighted assets ratio. The authors estimate accounts for taxes, and is thus shown as cumulative impact. The authors assume that banks' funding costs increase when their capital levels increase (i.e. the M-M theorem does not hold). The authors also estimate other scenarios with different assumptions for levels of passthrough of funding costs.

Slovik and Courneade (2011) assess the impact of higher capital requirements on the economy through an increase in lending spreads. Using an accounting approach, the researchers' findings imply a 109 basis point rise in lending rates in the US, 70 basis point rise in Europe, and 46 basis point rise in Japan due to an increase in equity to risk weighted assets ratio (using our projected total increase). The authors assume a full pass-through of the cost increases, and that banks would maintain the same discretionary capital buffers above regulatory minimums as these minimums are increased. This may overestimate the impacts of reforms in this analysis, as banks may lower their buffers given an increase in the regulatory minimums.

Kashyap, Stein, and Hanson (2010) evaluate the impact of heightened capital requirements on large financial institutions, and on their customers through an increase in loan rates. Using a reduced form model and model calibration approach, the authors' findings point to a 15 basis point increase in the long-run steady-state loan rates due to an increase in capital requirements in the US (using our projected total increase). The authors estimate three scenarios, varying their assumptions about the violation of the M-M theorem across the scenarios. The modeling approach used (essentially a reduced-form model) opens the work up to the Lucas critique, which notes that the optimal decisions of economic participants could change as a result of policy changes, and thus reduced-form models based on estimates of past behavior are not fully suitable for analyzing regulatory changes. The authors' estimates are on the lower end of the estimates discussed in this report, even when we consider that they include the impacts of only the capital reforms.²⁶³

Mendicino et al (2015) characterize social welfare maximizing capital requirement policies using a macroeconomic model with household, firm and bank defaults calibrated to Euro area data. The authors use a DSGE approach that points to a relatively modest impact of an increase in capital requirements. Their estimates point to a loan rate increase of 19 basis points (using our projected total increase). They do however find that there will be distributional differences to this impact. On a per 1% increase in capital ratio requirements level, mortgages will see a 14 basis point increase while corporates will see a 24 basis point increase in loan rates, without any additional RWA inflation.²⁶⁴ Mendicino et al (2015) assume that the M-M theorem does not hold, and make a number of other assumptions specific to individual participants in their model, e.g. saving households are assumed to maximize their present value of utility subject to the budget constraint. The DSGE approach allows the authors to capture a more holistic view of reforms albeit with a great deal of simplifying assumptions.

Baker and Wurgler (2015) also estimate relatively low impacts on loan rates when they examine the impact of capital reforms in the US. They use a regression-based approach and quantify an impact that implies that an increase in capital requirements will increase the lending rates by 32 basis points (using our projected total increase).²⁶⁵ In their analysis the authors assume that the low risk anomaly holds and that costs will be fully passed on to the customer.

²⁶³ Kashyap, Stein, and Hanson (2010), BCBS (2016h)

²⁶⁴ Estimate of impact on lending spreads (basis points) of increasing ratio of capital to assets by one percentage point is taken from BCBS (2016h)

²⁶⁵ Estimate of impact on lending spreads (basis points) of increasing ratio of capital to assets by one percentage point is taken from BCBS (2016h)

Finally, Sutorova and Teply (2013) measure the impact on lending rates of capital reforms in Europe. Using a simultaneous equations model where banks choose the optimal level of capital, the authors' findings imply that an increase in the equity to risk weighted assets ratio should lead to an increase in lending rates of 92 basis points (using our projected total increase). The authors assume that costs of the reforms will be passed through to the customer as banks display oligopolistic behavior and enjoy some price-setting market power.

IMPACT ON LOAN VOLUMES

A number of studies estimate the impact of capital requirement increases on lending volumes.

Mendicino et al (2015) characterize social welfare maximizing capital requirement policies in a macroeconomic model with household, firm and bank defaults calibrated to Euro area data. Based on a DSGE approach, their findings point to an average decline of loans of 0.3% due to a 1% increase in capital requirements. Their findings point to an impact that differs for different market segments. For mortgages, the decline will be only 0.15% while for corporates the decline is expected to be over 2 times that amount: 0.43%.²⁶⁶ The DSGE approach allows Mendicino et al (2015) to capture both the demand and the supply drivers of the decrease in loan volumes. However, the complexity of the DSGE forces the authors to make a number of other assumptions specific to individual participants in their model, e.g. saving households are assumed to maximize their present value of utility subject to the budget constraint. As such, a variety of factors could be driving the comparative low estimate.

Meeks (2014) develops a monetary vector autoregression (VAR) augmented with aggregate banking system and regulatory variables to study the impact of capital requirements on banks. The authors find that an increase in capital requirements leads to a 0.4% decrease in loan volume on average. This impact is uneven for mortgages and corporates: mortgage loan volume decreases by 0.2% and corporate loan volume decreases by 0.5%. The authors assume that macroeconomic news does not drive regulatory action and that bank lending is the only transmission mechanism to the wider economy.

Francis and Osborne (2009a) study the bank capital channel, where shocks to a bank's capital are assumed to have an effect on the level and composition of the bank's assets. The study's results imply that changes in bank capital regulation have implications for macroeconomic outcomes, as banks can respond by altering credit supply or making other changes to the asset mix. Based on general method of moments (GMM) procedures, the authors find that a single percentage point increase in capital requirements in 2002 would have reduced lending by 1.2%. The authors evaluate a 65% and a 100% pass through of the impact of capital requirements (65% would make their estimates lower than some peers). They also assume that the responses of the banking sector as a whole are the same as estimated for individual banks.

MAG (2010) evaluates the transition impact of increased regulatory requirements based on member country findings. In the final version of the MAG, findings imply that the median estimate is for a decline of lending of 1.4%. The MAG estimates focus on shorter-term impacts than most other studies discussed, and thus may overestimate long-term steady state impacts.

De-Ramon et al (2012) measure the impact of prudential policy on the macroeconomy in the UK. Based on a number of approaches including the NiGEM model, the findings imply a 1.6% decrease in loans from baseline levels after 5 years. Like many other studies, De-Ramon et al assume that the M-M proposition does not hold. They also assume that banks maintain the current level of voluntary capital buffers above the minimum requirements, and as such an increase in the minimum capital ratios translates to a one-to-one increase in individual banks' holdings. This may overestimate the impacts of reforms in this analysis, as banks may lower their buffers given an increase in the regulatory minimums. Additionally, the authors assume that the structural parameters of the economy estimated from the historical period do not change.

²⁶⁶ Estimate of impact on lending spreads (basis points) of increasing ratio of capital to assets by one percentage point is taken from BCBS (2016h)

Cosimano and Hakura (2011) study the impact of the new capital requirements introduced under the Basel III framework on bank lending rates and loan growth. Using a generalized method of moments approach based on OECD country data, the authors' findings imply that an increase in capital requirements is "predicted to reduce loans for the 100 largest banks by 1.3 percent in the long run." The authors assume the loan volume decline is driven by an increase in loan rate. The estimated impact is relatively small because of the small assumed elasticity of demand for loans. The authors note, however, that some sub-sets of the market are likely to see a bigger impact: for the crisis countries, a 1.3 percentage point increase in capital requirements is estimated to have a more substantial impact on loans (4.6%), since the elasticity of demand for loans is estimated to be about eight times larger than in the case of the 100 largest banks. All in all, the estimated elasticity of demand drives the overall estimate.

Sutorova and Teply (2013) first measure the impact of reforms on loan rates, and then determine the impact of the reforms on loan volume. Using a simultaneous equations model, the authors find that an increase in equity to RWA ratio will lead to a lending reduction of 1.4%–3.5% (average of 2.5%).²⁶⁷ This impact is somewhat higher than the majority of other estimates discussed in this paper, as it identifies a significant increase in lending rates due to capital requirements. This large increase in lending rates drives a large impact on volume.

Bridges et al (2014) estimate the effect of changes in microprudential regulatory capital requirements on bank capital ratios and bank lending in the UK. The authors use panel regressions to arrive at findings that imply that an increase in total regulatory capital as a proportion of total risk-weighted assets requirements will lead to a loan volume decrease of about 3.5%. The authors' work implicitly tests the violation of the Modigliani-Miller theorem. They also assume that banks react symmetrically, i.e. banks' responses to an increase in capital requirements are the mirror image of their response to a decrease. Should this assumption not hold, the impact of the change in capital requirements may differ.

Fraisse et al (2015) measure the impact of bank capital requirements on corporate borrowing and business activity. The authors use accounting data to estimate the impact of an increase in capital requirements on intensive and extensive margin of loans. The authors find that a one percentage point increase in capital requirement leads to a 1% reduction in lending at the intensive margin and an 8% reduction in lending at the extensive. The authors assume that different decisions about extensive margin (whether to extend a loan) vs. intensive margin (how much to loan). While the authors' results point to deviation from the M-M theorem in the short run, they assume that M-M theorem should hold in the long-run.

Noss and Toffano (2014) estimate the effect of changes in capital requirements on lending. The authors use reduced form models to find that an increase in the ratio of capital to risk-weighted assets leads to a loan volume decrease of 4.5%. The authors assume that the Modigliani-Miller theorem does not hold perfectly. They also take a supply-driven approach by assuming that the demand for credit is constant. Like many other papers using similar methodologies, their paper is open to the Lucas critique, which notes that the optimal decisions of economic participants could change as a result of policy changes, and thus reduced-form models based on estimates of past behavior are not fully suitable for analyzing regulatory changes.

Gambacorta and Shin (2016) evaluate the impact of 1 percentage point increase in ratio of equity to total assets on cost of debt financing, and loan growth using OLS regression and GMM. They find that a 1% increase in equity to total assets ratio leads to a 0.6 percentage point increase in annual loan growth, as banks with higher capital are likely to lend more. The study calculates a significant reduction in cost of debt (4 basis points) resulting in approximately a 50% Modigliani-Miller offset, not taking account of the tax benefit of debt (which would lower the offset) or the reduction in required return on equity (which would raise the offset).

Additionally, a number of studies estimate the impact of capital increases on the lending growth rate.

²⁶⁷ Estimate of impact on lending spreads (basis points) of increasing ratio of capital to assets by one percentage point is taken from BCBS (2016h)

Aiyar, Calomiris and Wieladek (2014) study the interaction of monetary policy and capital requirements, and their impact on lending rates in the UK. Using panel regression and VAR analysis, the authors find that an increase in capital requirements will lead to a decline of the growth rate in real lending to the economy of about 4.6% upon impact. The authors assume that change in capital requirements impacts real lending with a lag. This study is somewhat different from others covered in this report, as it focuses on the decline in growth rate of lending, rather than a decline in real volume. As such, it is not shown in the comparative chart.

Mesonnier and Monks (2014) study the impact of an increase of capital on loan growth, utilizing a dataset of balance sheet of banks subject to EBA's 2011/12 Capital Exercise, during which banks had to increase their capital within a short time frame. Using a regression, the authors find that banks that had to increase their capital by 1% of risk-weighted assets tended to have annualized loan growth between 1.2% and 1.6% lower than banks that did not have to increase their capital ratios (over the 9 month period of the exercise). The authors assume that in the short-run, M-M theorem does not hold, and assume that an identified capital shortfall at the group level in the data sample had a uniform impact on the lending growth of all entities within the group.

APPENDIX C. DETAILED SUMMARY OF MEASUREMENT APPROACHES USED IN QUANTITATIVE STUDIES

A number of official and academic studies have been conducted to evaluate the impact of Basel reforms, utilizing various methodologies. The most common approaches are discussed below.

Balance sheet/accounting approach

The balance sheet/accounting approach estimates the spread between the cost of equity and the cost of debt using balance sheet data. Studies utilizing this approach evaluate the impact of increasing capital ratios on a bank's cost of funding using estimates of the long-run return on equity and the required rate of return on debt, including an adjustment for the effects of taxation. As a second step, studies use bank balance sheet data to calculate the extent to which interest rates on loans would need to rise to offset the increase in funding costs. This approach usually assumes that banks re-price only their loans, as banks have less ability to re-price deposits (and less need to do so in the post-crisis environment), bonds, etc. The degree to which banks pass through this increase in pricing is one of the critical assumptions that dictate the magnitude of findings.

One of the greatest strength of this approach is its intuitiveness, transparency, and availability of data required for the calculations. However, accounting models have a number of drawbacks, such as the fact these models do not take into account the interaction between loan pricing and market demand, and they usually do not fully address the issue of how default risk affects the cost of funding. Despite these drawbacks, a number of studies utilize this approach, such as Slovik and Cournede (2011) and King (2010).²⁶⁸

Simulation-based approaches

Researchers employ simulations, such as the Vector Error Correction Model (VECM), to use bank data to evaluate the impact of regulation. The VECM model is used to estimate a long-term relationship between a small set of macro-variables. VECMs model are built upon the Error Correction Model (ECM), a multiple time series model used for studies that include data with underlying variables that have a long-run stochastic trend. One of the key strengths of this approach is that it allows the researcher to disentangle demand and supply factors within the lending market in a steady-state. However, this model is vulnerable to the Lucas critique, which states that the decisions of economic agents could change in response to policy changes, and therefore "reduced-form" models based on estimates of past behavior are not fully capable of analyzing regulatory change. The VECM approach is utilized in studies including Gambacorta (2011) and Angelini et al (2011).²⁶⁹

The Generalized Method of Moments is also a simulation-based model that estimates parameters using both data and constraints from economic theory called "moment conditions". The parameters are then used to estimate the target metric. GMM is a commonly used approach for econometric modelling, as it overcomes a number of difficulties present in other models. A key strength is its low reliance on assumptions, including assumptions about the distribution of a variable. The GMM approach is utilized in studies including Cosimano and Hakura (2011) and Francis and Osborne (2009a).²⁷⁰

²⁶⁸ BCBS (2016h), De-Ramon et al (2012), King (2010), Slovik and Cournede (2011)

²⁶⁹ BCBS (2016h)

²⁷⁰ Zsohar (2012), Simply Statistics (2013)

Partial Equilibrium models

Partial Equilibrium models evaluate the impact of regulations in the directly affected markets. These models are less complex than general equilibrium models, which seek to examine impacts in several markets simultaneously rather than a single market in isolation. Since Partial Equilibrium models look at a single market in isolation and, relatedly, because they do not take price effects into consideration, their results may not always capture the full impact of regulation. However, partial equilibrium models are frequently used in the evaluation of the impacts in studies such as De Nicolò, Gamba, and Lucchetta (2014).²⁷¹

Dynamic stochastic general equilibrium (DSGE) models

Like other general equilibrium models in economics, DSGE models are used to model the behavior of the economy as a whole by analyzing the interaction of multiple variables. DSGE models are dynamic, evaluating effects on the economy over time, and stochastic, taking into account the random shocks such as changes in macroeconomic policy-making. These models are built around a demand block, a supply block, and a monetary policy equation.

Due to their multi-faceted analysis, DSGE models are able to generate a broadly consistent picture of the steady-state impact of an increase in capital requirements on bank lending, activity, and general welfare. However, DSGE²⁷² are highly complex and require researchers to make a number of parametric assumptions and make decisions about which mechanisms that affect the dynamics of the economy should be incorporated into the model. These assumptions and decisions have a significant impact on the outcome of the results. Examples of studies utilizing this approach include Angelini and Gerali (2012) and Covas and Driscoll (2014).²⁷³

NIGEM model

The NiGEM incorporates many components of a DSGE model while using a “New-Keynesian” framework. While the New Keynesian model is not equivalent to a DSGE model as it uses a small number of equations, estimated in a VAR and specified in logarithms, many of the characteristics are similar. This model is structured around the national income identity, which can accommodate forward looking consumer behavior. The NiGEM model utilizes historical data, enabling its use for policy analysis and forecasting. Like many of the other approaches described above, the NiGEM model is heavily reliant on a number of critical assumptions that impact the magnitude of the results. The NIGEM model is used by studies such as De Ramon et al (2012).

Top-Down Stress Testing Models

Top-down stress testing models are used as part of stress testing, in part to evaluate the impact of stress scenarios on solvency of the banks. Some of the stress testing frameworks incorporate liquidity and solvency risks, and assume that banks are first faced with solvency shocks, which are then potentially followed by withdrawals of short-term funding driven by investors’ concerns about the future solvency of individual banks.²⁷⁴

Other Models/Approaches

Apart from the approaches described above, multiple other econometric and other approaches are used in impact studies, e.g. time series, panel regression, other econometric techniques, as well as simpler approaches like evaluation of market trends. Each of these techniques includes its own set of strengths and drawbacks that researchers trade off in their evaluations.

²⁷¹ BCBS (2016h), Covas and Driscoll (2014) is another example.

²⁷² There are multiple variations to DSGE models. For example, the 3D model approach introduces financial intermediation and three layers of default into a dynamic stochastic general equilibrium (DSGE) model. Used by Clerc et al (2015), this model provides a rationale for capital regulation as a welfare improving response to distortions, including undesired effects of safety net guarantees and bank funding cost externalities.

²⁷³ BCBS (2016h), Sbordone et al (2010), Villaverde (2009), Angelini and Gerali (2012), Covas and Driscoll (2014)

²⁷⁴ BCBS (2016h)

MEASUREMENT APPROACHES USED IN BCBS STUDIES

The BCBS and sister organizations conducted several impact studies: Basel Committee's Long-term Economic Impact²⁷⁵ and Macroeconomic Assessment Group (MAG 2010) reports are the key studies focused on quantitative impacts across multiple reforms.

The MAG (2010) focuses on estimating the transitional costs of moving to higher capital ratios in terms of the reduction in lending and impact on the GDP for an advanced economy, drawing on analytical work conducted by member countries. The study drew on forecasting and other analytical models developed by member countries to estimate the impact of a single percentage point rise in bank capital ratios. It evaluates lending spread and volume impacts of reforms using a number of satellite models, which utilized a variety of approaches. As a second step, the MAG uses these lending impacts to evaluate GDP impacts of capital reforms using macroeconomic models.²⁷⁶

The LEI study focuses on estimating the steady-state costs and benefits of the stronger capital and liquidity requirements. It draws on analysis from a number of sources and derives the benefit as the reduction in the probability of crisis due to the higher capital requirements, and derives the costs as the reduction in output due to higher lending spreads driven by higher bank funding.²⁷⁷ First, the study utilized an accounting approach to evaluate the impact of increased requirements on lending rates. Second, the study utilized a suite of models including dynamic stochastic general equilibrium (DSGE) models, semi-structural models, and reduced-form models to evaluate the impact of increases in bank capital and liquidity on the steady-state levels of output. Wherever possible, the study utilized the same models as the MAG (2010). Critically, the study assumed that the increase in funding costs are fully passed through to the borrowers, and that the cost of capital does not fall despite banks becoming less risky (in other words, the study assumed that the Modigliani-Miller theorem does not hold or is precisely offset by some set of other non-modelled factors).

The Basel Committee has also conducted a number of more detailed quantitative impact studies on individual reforms, including studies on the revised market risk framework and on Total Loss Absorbing Capacity requirements (TLAC).

The BCBS has recently released the final rule on capital requirements for market risk²⁷⁸ which follows the proposed framework on market risk that was initially posed in the 2013 Fundamental Review of the Trading Book (FRTB) consultative document.²⁷⁹ As part of the development for the final rule, the BCBS conducted a study in 2014 to evaluate the proposed framework, which included analysis on the variability of risk metrics, consistency of the rules, and change between the updated and previous framework. In the study, the BCBS runs a hypothetical portfolio exercise (HPE) in which banks provided information, such as risk metrics for their trading books, based on the hypothetical application of the new framework. Data is analyzed to determine variability of risk measures as compared to the previous framework.²⁸⁰ The FRTB Interim Analysis study published in 2015 also reviews the proposed revision of the market risk framework, and focuses on evaluating the framework's impact to bank capital ratios under both the proposed standardized approach and the internally-modelled approach. The BCBS performs summary statistics and data analytics on information that banks volunteered to provide, which includes bank capital charges calculated based on the new guidelines.²⁸¹

Other studies evaluate the Total Loss Absorbing Capacity (TLAC) requirements, which are set out by the Financial Stability Board (FSB) as a safety measure against systemic risk. In one study, the Economic Impact Assessment

²⁷⁵ Cited in the bibliography as BCBS (2010a)

²⁷⁶ BCBS (2016h), MAG (2010a, 2010b)

²⁷⁷ BCBS (2010a)

²⁷⁸ BCBS (2016g)

²⁷⁹ BCBS (2013j)

²⁸⁰ BCBS (2014k)

²⁸¹ BCBS (2015f)

Group (EIAG) evaluates the micro- and macroeconomic costs and impacts associated with TLAC requirements. The study derives measures such as change to lending rates and GDP.²⁸² FSB and BCBS also published a Summary of Findings from the TLAC Impact Assessment Studies, which includes a summary of findings about the impacts of TLAC, including a 2015 QIS. The BCBS (and FSB) published a TLAC Quantitative Impact Study Report that evaluates whether G-SIBs will be able to meet TLAC requirements. For the study, a sample of banks was asked to provide risk-based ratios and leverage ratios that were calculated in accordance with the basic TLAC framework guidelines as well as three variations on the basic framework that was proposed at the time. The data was then aggregated and analyzed.²⁸³

BCBS has published other impact studies such as those in the Regulatory Consistency Assessment Programme (RCAP) and continues to evaluate the impacts of proposed regulation for the revision and finalization of new rules.

MEASUREMENT APPROACHES USED IN OTHER STUDIES

While some studies utilize a single model approach, the majority uses a combination of approaches and relies on a number of critical assumptions. For example, AFME and PwC (2014c) examines the impact of regulatory reforms on bank's efforts to recapitalize and re-shape. In addition to approaches described above, the researchers also examine bank responses to regulation in the shape of cost savings programs that have been launched at financial institutions across Europe, and bank exits from non-core business areas. GFMA, IIF and PwC (2015) also track market trends, such as the contraction in the repo market. While these studies aim to capture the effects of regulations on the market, they are not always able to establish a cause-effect relationship with confidence, as they cannot isolate impacts of underlying market trends.²⁸⁴

CHALLENGES OF IMPACT MEASUREMENT APPROACHES

Studies that attempt to quantify the benefits from a decline in the frequency and severity of financial crises as a result of the reforms generally use one or more of the methodologies discussed above, though some utilize simpler approaches. These studies can be particularly challenging for two reasons. First, macroprudential policy is implemented in response to signs of growing risks, imbalances, or decline in the financial system and it is therefore difficult to evaluate how these trends would have played out in the absence of the policy. Second, these policies are usually implemented in conjunction with other policies, such as expansionary monetary policies. Thus, it is difficult to disentangle the impacts. Despite these challenges, researchers supplement macroeconomic techniques with methodologies such as calculating the annual savings from reductions in the frequency of financial crises.²⁸⁵

²⁸² Experts Group for the FSB (2015)

²⁸³ BCBS (2015i), FSB and BCBS (2015)

²⁸⁴ AFME and PwC (2014c), GFMA, IIF and PwC (2015)

²⁸⁵ Freixas, Laeven and Peydro (2015), BCBS (2016h)

APPENDIX D. GLOSSARY OF ACRONYMS

ACRONYM	TERM
ABS	Asset-Backed Securities
ALA	Alternative Liquid Asset
AFME	Association for Financial Markets in Europe
AMA	Advanced Measurement Approach
ASF	Available Stable Funding
ASIFMA	Asia Securities Industry and Financial Markets Association
AUM	Assets Under Management
BAFT	Bankers Association for Finance and Trade
BCBS	Basel Committee On Banking Supervision
BoE	Bank of England
CA	Comprehensive Assessment
CCAR	Comprehensive Capital Analysis And Review
CCF	Credit Conversion Factors
CCP	Central Counterparty
CCR	Counterparty Credit Risk
CCyB	Countercyclical Capital Buffer
CE	Common Equity
CEM	Current Exposure Method
CET1	Common Equity Tier 1
CFO	Chief Financial Officer
CFTC	Commodity Futures Trading Commission
CLF	Committed liquidity facilities
Coco bonds	Contingent convertible bonds
CPSS	Committee On Payments And Settlement Systems
CSRBB	Credit Spread Risk In The Banking Book
CVA	Credit Valuation Adjustment
DFA	Dodd-Frank Act
DFAST	Dodd-Frank Act Stress Test
DRC	Default Risk Charge
DSGE	Dynamic Stochastic General Equilibrium
EACB	European Association of Co-operative Banks
EBA	European Banking Authority
EBF	European Banking Federation
EC	European Commission
ECB	European Central Bank
EIAG	Economic Impact Assessment Group
ECM	Error Correction Model
EMDE	Emerging Markets and Developing Economies
EMIR	European Market Infrastructure Regulation
EPE	Expected Positive Exposures
ES	Expected Shortfall
ESRB	European Systemic Risk Board
EU	European Union
EVE	Economic Value of Equity
FCA	Financial Conduct Authority
FRTB	Fundamental Review Of The Trading Book
FSB	Financial Stability Board
GFMA	Global Financial Markets Association
GMM	General Method Moments
G-SIBs	Global Systemically Important Banks

HQLA	High Quality Liquid Assets
IACPM	International Association of Credit Portfolio Managers
ICC	International Chamber of Commerce
ICMA	International Capital Market Association
IIF	Institute of International Finance
IHC	Intermediate Holding Company
IMM	Internal Model Method
IMS	Internal Measurement System
IOSCO	International Organization Of Securities Commissions
IRB	Internal Ratings Based
IRRBB	Interest Rate Risk In The Banking Book
ISDA	International Swaps and Derivatives Association
LC	Letter of Credit
LR	Leverage Ratio
LCR	Liquidity Coverage Ratio
M-M	Modigliani-Miller
MiFID	Markets in Financial Instruments Directive
NFC	Non-Financial Corporation
NiGEM	National Institute Global Econometric Model
NII	Net Interest Income
NIM	Net Interest Margin
NMRF	Non-Modellable Risk Factors
NSFR	Net Stable Funding Ratio
OECD	Organization for Economic Co-operation and Development
OTC	Over-The-Counter Derivative
P&L	Profit and Loss
PD	Probability of Default
PFE	Potential Future Exposure
PSE	Public Sector Entities
QCCP	Qualifying Central Counterparty
QIS	Quantitative Impact Study
RC	Replacement Cost
RCAP	Regulatory Consistency Assessment Programme
RMBS	Residential Mortgage-Backed Securities
RoRWA	Return on Risk-Weighted Assets
RRP	Recovery and Resolution Plan
RSF	Required Stable Funding
RWA	Risk-Weighted Assets
SA	Standardized Approach
SA-CCR	Standardized Approach For Measuring Counterparty Credit Risk Exposures
SEC	Securities and Exchange Commission
SBA	Sensitivity Based Approach
SEF	Swap Execution Facility
SIFMA	Securities Industry and Financial Markets Association
SM	Standardized Method
SMA	Standardized Measurement Approach
SME	Small and Medium Enterprise
SPE	Special Purpose Vehicles
TCH	The Clearing House
TLAC	Total Loss-Absorbing Capacity
UCC	Unconditionally Cancellable Commitments
VaR	Value-At-Risk
VAR	Vector Autoregression
VECM	Vector Error Correction Model

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