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Impact of BASEL on banking regulation in Europe

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List of Acronyms and Abbreviations

BIS Bank for International Settlements
BCBS Basel Committee on Banking Supervision
CART classification and regression trees
CSPs credit services providers
CfA Call for Advice
CRSPs credit reporting service providers
EAD Exposure at default
EBA The European Banking Authority
ECL Expected credit loss
ECB European Central Bank
EIB European Investment Bank
EBA European Banking Authority
EU European Union
FVTPL fair value through profit and loss
GDP Gross Domestic Product
GHOS Group of Governors and Heads of Supervision
GIIRS Global Impact Investing Rating System
HVCF Hybrid Venture Capital Fund
IASB The International Accounting Standards Board
IFRS International Financial Reporting Standards
IOSCO International Organization of Securities Commissions
IAS International Accounting Standards
ICE Individual conditional expectation
LGD loss given default
LIME local interpretable model-agnostic explanations
LEI Long-term Economic Impact
LCR Liquidity Coverage Ratio
MLP multilayer perceptron
MSMEs micro, small, and medium enterprises
NLP natural language processing
NSFR Net Stable Funding Ratio
OCC Office of the Comptroller of the Currency
PD partial dependence
PD Probability of default
PR precision-recall
PSD 2 revised Payment Services Directive
RWP risk-weighted properties
R&D Research and Development
RCAP Regulatory Consistency Assessment Program
ROE Return On Equity
ROC receiver operator characteristic
SAR Special Administrative Region
SSPI Solely Principle Payments and Interest
SVM support vector machine
TRIM Targeted Review of Internal Models
VC Venture Capitalist

Chapter 1 Overview

1.1 About the Basel Committee on Banking Supervision

What is BIS? It is Bank for International Settlements and its purpose is to assist as a bank for central banks and to aid central banks in their promotion of monetary and financial stability via international cooperation. In order to carry out its goal, it provides central banks with:

1. a platform for consultation and broad international collaboration
2. a venue for responsible creativity and technology exchange
3. in-depth research and perspectives on key policy challenges
4. financial systems that are fair and competitive

The BIS was founded in 1930 and is operated by 63 central banks serving countries from all over the world, accounting for approximately 95% of global GDP. Its headquarters are in Basel, Switzerland, and it has two representative offices: one in Hong Kong Special Administrative Region (SAR) and one in Mexico City, along with Innovation Hub Sites around the world.

The Basel Committee

The Basel Committee on Banking Supervision (BCBS) is the official global standard-setter for bank prudential oversight and serves as a platform for daily cooperation on banking supervisory issues. Its 45 members are central banks and bank supervisors from 28 different countries.

The Basel Committee, previously known as the Committee on Banking Regulations and Supervisory Practices, was formed at the end of 1974 by the central bank Governors of the Group of Ten countries in the aftermath of major disruptions in international currency and banking markets (notably the failure of Bankhaus Herstatt in West Germany).

The Committee, headquartered at the Bank for International Settlements in Basel, was created to improve monetary sustainability by improving the level of banking regulation around the world, as well as to serve as a platform for frequent cooperation among its participating countries on banking supervisory matters. The first session of the Committee was held in February 1975, and sessions have been organized three to four times a year since then.

The Basel Committee's membership has grown from the G10 to 45 organizations from 28 countries since its establishment. Beginning with the Basel Concordat, which was first published in 1975 and has been amended many times since, the Committee has developed a set of international criteria for bank supervision, most notably its seminal publications of the capital adequacy accords and are generally referred to as Basel I, Basel II, and, most recently, Basel III.

1.2 Basel I: the Basel Capital Accord

With the groundwork for foreign bank oversight in place, capital adequacy quickly became the Committee's primary objective. The onset of the Latin American debt crisis that began 1980s heightened the Committee's fears that the capital levels of the major multinational banks were declining at a time of rising international threats. With the support of the G10 Governors, Committee members agreed to stop the deterioration of capital requirements in their financial structures and work for greater integration in capital adequacy calculation. This reflected in general agreement on a weighted approach to portfolio optimization, both on and off banks' balance sheets.

The Committee unanimously agreed on the critical importance of a multinational agreement to improve the integrity of the international financial system and to eliminate a source of competitive imbalance caused by disparities in national capital requirements. Previous statements on a consultative paper published in December 1987, the G10 Governors authorized a capital assessment scheme known as the Basel Capital Accord, which was made available to banks in July 1988.

The 1988 Accord provided for a minimum capital-to-risk-weighted-assets ratio of 8% to be enforced by the end of 1992. Finally, this system was implemented not only in member countries, but also in almost all countries with functioning multinational banks. In September 1993, the Committee released a statement stating that banks in the G10 countries with significant foreign banking business were fulfilling the Accord's minimum criteria.

The Agreement was indeed meant to change over time. In November 1991, it was updated to more specifically specify the general conditions or general loan loss allowances that should be used in the capital adequacy measure. The Committee released another reform in April 1995, which went into effect at the end of the year, to recognize the implications of bilateral netting of banks' credit risks in derivative products and to extend the matrix of add-on variables. Another paper, released in April 1996, explained how Committee members intended to recognize the consequences of multilateral netting.

The system was also refined by the Committee to fix threats other than credit risk, which was the objective of the 1988 Accord. Following two consultative procedures, the Committee released the Amendment to the Capital Accord to add business risks (or Market Volatility Amendment) in January 1996, which went into force at the end of 1997. This was intended to provide a capital obligation for market risks resulting from banks' exposures to foreign currency, exchanged debt instruments, equities, services, and options in the Agreement. The Market Volatility Reform was significant in that it permitted banks for the first time to use internal models (value-at-risk models) to measure their market risk capital needs, according to strict quantitative and qualitative criteria. Most of the groundwork for the business risk kit was done in collaboration with securities regulators.

1.3 Basel II: the new capital framework

The Committee released a recommendation for a revised capital adequacy agreement to substitute the 1988 Agreement in June 1999. This resulted in the June 2004 release of an updated capital system. The revised architecture, named "Basel II," consisted of three foundations:

1. minimum capital criteria, which aimed to improve and broaden the standardized rules established by the 1988 Accord.
2. supervisory review of a financial institution's capital adequacy and internal appraisal mechanism
3. successful use of transparency as a tool to improve business discipline and promote healthy banking practices

The new structure was created to reform the way regulatory capital criteria represent underlying risks and to help handle recent financial innovation. The revisions were designed to reward and encourage ongoing progress in risk measurement and management.

The structure was published in June 2004 after nearly six years of rigorous planning. During this period, the Basel Committee held detailed consultations with officials from the financial industry, supervisory authorities, central banks, and outside analysts in order to create much more risk-sensitive capital criteria.

Following the publication in June 2004, which was largely based on the banking book, the Committee turned its attention to the trading book. The Committee released a consensus paper regulating the handling of banks' trading books under the current regime in July 2005, in close collaboration with the International Organization of Securities Commissions (IOSCO), the international body of securities regulators.

Committee members and a few non-members decided to implement the revised guidelines, but under different timetables. One obstacle that managers worldwide encountered under Basel II was the need to approve the use of such risk assessment methods in different jurisdictions. Although this was not a novel idea for the supervisory community – the Market Risk Amendment of 1996 had a similar provision – Basel II expanded the reach of those permissions and required much greater collaboration between home and host supervisors.

1.4 Basel III: responding to the 2007-09 financial crisis

Even before Lehman Brothers went bankrupt in September 2008, it was clear that the Basel II system needed to be fundamentally strengthened. The banking system went through the financial crisis with excessive debt and insufficient liquidity reserves. These flaws were accompanied by ineffective administration and risk control, as well as ineffective compensation mechanisms. Mispricing of credit and liquidity risks, as well as excess credit expansion, illustrated the perilous combination of these factors.

In response to these risk factors, the Basel Committee released Concepts for sound liquidity risk control and oversight in the same month that Lehman Brothers collapsed. In July 2009, the Committee released a new list of information to improve the Basel II financial system, focusing on the handling of some dynamic securitized positions, off-balance-sheet vehicles, and trading book exposures. These enhancements were part of a larger initiative to increase the oversight and supervision of globally operating banks in the aftermath of the financial market crisis.

In September 2010, the Group of Governors and Heads of Supervision (GHOS) proposed higher global minimum capital requirements for commercial banks. This preceded an accord in July on the overall configuration of the capital and liquidity transformation plan, now known as "Basel III." The new capital and liquidity principles were approved at the G20 Leaders' Summit in Seoul in November 2010, and were subsequently decided upon at the Basel Committee meeting in December 2010.

The Committee published suggestion guidelines in mid-December 2010, and was later updated. The December 2010 versions were published in Basel III: International mechanism for liquidity risk measurement, guidelines, and reporting and Basel III: A global regulatory framework for more resilient banks and financial structures. The strengthened Basel system revises and enhances the three foundations defined by Basel II, as well as expanding them in many ways. The majority of the amendments will take effect between 2013 and 2019:

- stricter criteria for the quality and quantity of regulatory resources, particularly strengthening the central position of common equity
- a further into of common equity - the liquidity coverage buffer - that, when violated, limits payouts to support meet basic common equity obligation
- a countercyclical capital buffer that limits banks' involvement in system-wide credit booms in order to minimize their losses in credit busts
- a debt ratio - a minimal amount of damage -absorbing liquidity in relation to all of a bank's reserves and off-balance-sheet exposures, independent of risk weighting
- Liquidity criteria - a minimum liquidity level, the Liquidity Coverage Ratio (LCR), designed to have adequate cash to meet financing needs across a 30-day stress period; and a longer-term ratio, the Net Stable Funding Ratio (NSFR), designed to resolve duration mismatches around the entire balance sheet.
- additional conditions for systemically relevant banks, such as increased loss absorbency and improved cross-border oversight and resolution structures.

Beginning in 2011, the Committee focused on improving the measurement of capital needs. The Basel II framework's risk-based capital provisions were extended to include:

- Capital criteria for banks' exposures to central counterparties were established in 2012 as an intermediate solution, which was later revised in 2014.
- Margin provisions for non-centrally cleared derivatives and capital requirements for banks' equity in funds were implemented in 2013.
- In 2014, a standardized methodology for calculating counterparty credit risk exposures was developed, which improved previous methodologies for determining counterparty credit risk in proprietary trading.
- In 2014, a more rigorous system for estimating capital criteria for securitizations was introduced, as well as broad risk caps that minimize the potential loss a bank could suffer in the case of a counterparty's sudden collapse.
- In 2016, a new business risk policy was introduced as a result of a thorough examination of trading book capital criteria.
- A consolidated and improved system for transparency criteria that takes into account the evolution of the Basel standards

In 2017, the Committee concluded its post-crisis Basel III reforms by publishing new guidelines for calculating capital needs for collateral risk, credit value adjustment risk, and operating risk. Based on the new standardized approaches, the final changes also include a revised leverage level, a leverage ratio buffer for global systemically critical banks, and a performance floor, which reduces the degree to which banks can use internal frameworks to mitigate risk-based capital requirements. These final changes fix flaws in the pre-crisis regulatory process and lay the groundwork for a resilient financial system that serves the real economy.

One of the revisions' main goals was to reduce the undue uncertainty of Risk-Weighted Properties (RWA). During the height of the global financial crisis, many creditors lost confidence in banks' recorded risk-weighted capital ratios. The Committee's own methodological analyses revealed a concerning degree of uncertainty in the estimation of RWA by banks. The regulatory framework changes would help to restore trust in RWA estimation by improving the robustness and risk resilience of formalized approaches for credit risk and operating risk, constraining internally simulated strategies, and supplementing the risk-based structure with an updated leverage ratio and performance floor.

1.5 Implementation

Members of the Committee have agreed to strictly enforce Basel requirements for their globally operating banks under the terms of their charter. These criteria are minimum requirements, and BCBS members can choose to go beyond them.

In January 2012, the GHOS approved the Committee's systematic mechanism for monitoring members' adoption of Basel III. The Regulatory Consistency Assessment Program (RCAP) is made up of two separate but related work streams that track the timely implementation of Basel III standards and determine the consistency and completeness of the adopted standards, as well as the importance of any deviations from the regulatory system.

1.6 Executed summary

- The European banking system will be significantly impacted by Basel III. As written today, and focused on Q2 2010 balance sheets, the market would need approximately €1.1 trillion in new Tier 1 finance, €1.3 trillion in short-term liquidity, and approximately €2.3 trillion in long-term financing by 2030, assuming no mitigation measures are taken.

- The effect on the smaller US banking sector would be close, but the underlying causes will differ. The Tier 1 capital deficit is estimated to be $870 billion (€600 billion), the short-term liquidity gap to be $800 billion (€570 billion), and the long-term financing gap to be $3.2 trillion (€2.2 trillion).

- The capital demand is almost 60% of all existing Tier 1 capital in Europe and the United States, and the liquidity deficit is about 50% of all existing short-term liquidity.

- Assuming a 50% deferred revenue dividend ratio and 3% nominal annual balance-sheet expansion over 2030, Europe's capital requirements are forecast to rise to around €1.2 trillion, short-term funding demands to around €1.7 trillion, and long-term financing needs to around €3.4 trillion.

- Closed openings would have a major effect on profitability. Everything else being same, Basel III will cut the average bank's Return on Equity (ROE) by around 4 % points in Europe and around 3 % in the United States.

- The retail, business, and investment banking markets would also be impacted differently. Retail banks may be the least impacted, while institutions with very low capital levels may face considerable pressure. Corporate banks will be most affected in specialist banking and trade financing. A few core businesses of investment banks, especially trading and securitization, will be severely impacted. Any banks with large capital markets and trading operations will certainly face significant business-model problems in the coming years.

- Banks are now attempting to handle ROE in the modern world by reducing costs and increasing premiums. There are, however, a variety of additional measures that banks should consider, both general and unique to Basel III:

    - A series of “no-regrets” measures to mitigate capital and liquidity inefficiency caused by suboptimal new rule enforcement.

    - Balance-sheet consolidation to increase capital efficiency and reduce capital requirements resulting from Basel III deductions, as well as more efficient management of finite balance-sheet tools.

    - Alterations to market models to build resource- and liquidity-efficient business models and goods, as well as rethinking the complexity and even feasibility of particular business lines

- We expect that the first two sets of acts could offset up to 40% of Basel III's ROE effect, with major differences based on individual banks' starting position and market competitive conditions. Conclude, banks are unlikely to be able to balance the effect of Basel III on profitability.

- Despite the lengthy implementation, time provided by Basel III, compliance with new procedures and monitoring have been substantially completed by the end of 2012. We predict that the operational execution alone would add 30 to 50 percent to the substantial outlay already incurred for Basel II for a typical midsize bank. Implementing the new regulations would necessitate three separate initiatives: Basel III policy planning, capital and risk analysis, and compliance management.

1.7 Introduction

On September 12, 2010, the Basel Committee on Banking Supervision approved the appendix it released on July 26 (July 2010 Annex) and defined additional specifics for capital requirements, including target ratios and adjustment times during which banks would conform to the new regulations. The outcomes have now been accepted by the recently ended G20 summit in Seoul. With that, even with the exception of the upcoming care of systemic entities, Basel III, as the current guidelines are widely called, seems to be almost complete.

The new legislation aims to make the financial system stronger by correcting many of the shortcomings exposed during the crisis. Improving capital efficiency and breadth, as well as refocusing on liquidity management, are meant to encourage banks to strengthen their underlying risk-management capability. The reasoning is that, in the end, if banks develop a radically different view of their risks—what we call a new risk paradigm—it should be beneficial for their industry as well as for clients, investors, and governments.

The focus of Basel III is on capital and financing. It defines new capital aim ratios, which are characterized as a core Tier 1 requirement of 7.0 percent, a minimum of 4.5 percent of core Tier 1 capital, and a mandatory capital retention buffer of 2.5 percent. The overall threshold for all Tier 1 capital is set at 8.5 percent, which includes the main Tier 1 minimum of 7.0 percent and a minimum of 1.5 percent for additional (noncore) Tier 1 capital. Basel III also establishes new short-term funding guidelines and outlines long-term funding criteria.

The new regulations would have a large effect. In the absence of any mitigating measures, we forecast the effect on the European and US banking industries to be a capital deficit of €1.7 trillion; Europe: €1.1 trillion; and the US: €0.6 trillion, representing almost 60% of both European and US Tier 1 capital outstanding; and a short-term liquidity shortfall of €1.9 trillion (Europe: €1.3 trillion, the US: €0.6 trillion) (Exhibit 1). Long-term funding ratios are still being sorted out; if they are now described, long-term funding ratios will have a substantial effect, resulting in a deficit of approximately €2.3 trillion in Europe alone. Long-term financing will be equally impacted in the United States, where we predict a €2.2 trillion deficit. In the following part, we go through the different consequences of the new rules in greater depth.

In reaction to the new legislation, banks are now increasing their resources, financing stocks, and offloading risk in a variety of ways. There are three additional sets of measures to guide the ship around the tides of Basel III: improved capital and liquidity control, balance-sheet restructuring, and business-model changes. The emphasis of this white paper is a thorough discussion of the possible steps that banks could take under these three headings. The majority of these measures explicitly discuss Basel III issues, but others go beyond and beyond.

Nevertheless, the challenge is enormous. Banks face a huge challenge simply complying with the current rules and ratios, let alone reorienting the organization for growth. The lengthy transition times mandated by Basel III, with certain regulations not taking effect until 2019, make the compliance

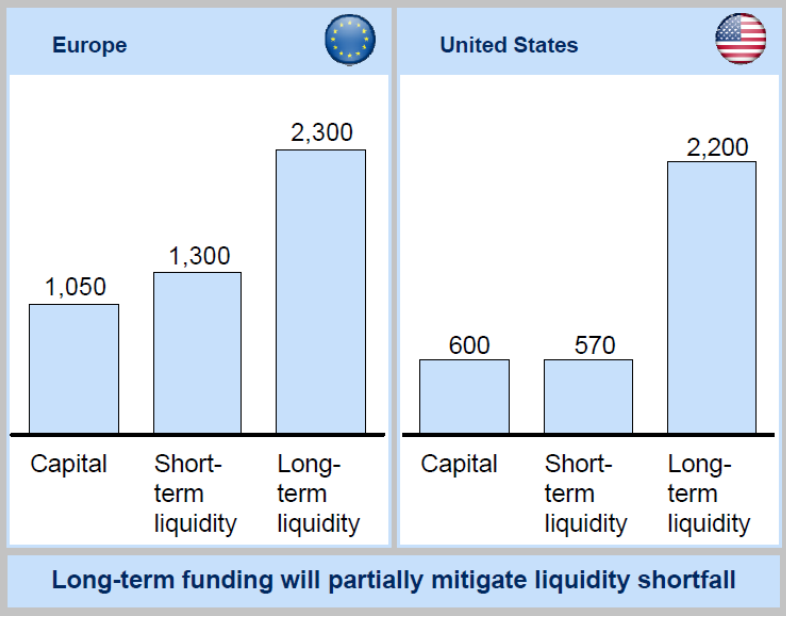
challenge much more difficult. In reality, banks have begun tracking those ratios well in advance of the required enforcement date—as early as the end of 2012. Several banks have shown a willingness to fulfill the criteria much earlier in order to satisfy markets and rating agencies while still giving themselves operational stability.

In the critical part of this thesis, we examine the implementation difficulties, especially the unparalleled complexity; calculate the cost to banks of preparing for Basel III; and outline the factors for effective implementation.

Exhibit 1: Capital and Liquidity shortfalls, Static perspective 2030

Exhibit 1

Capital and liquidity shortfalls for Europe and the United States will be significant.



CHAPTER 2 SURVEYING THE EFFECT

The European Banking Authority (EBA) published an article on the effect of the latest Basel III reforms being implemented in the EU on December 10, 2020. The final adoption of Basel III in 2028 will result in a 15.4 percent rise in the existing Tier 1 minimum necessary capital of EU banks. Since the reference date for this impact calculation is December 2019, the findings do not reflect the economic impact of the COVID-19 pandemic on participating banks.

In addition to the study's findings, the EBA will issue a more comprehensive ad hoc report on Basel III on the same day, on 15 December 2020, in response to the European Commission's Call for Advice (CfA) on Basel III (December 2019). The study's aggregate findings are not explicitly equivalent to those of the CfA report since they are based on significantly different samples (composition and size) and two main methodological variations. The most significant methodological distinction is the use of multiple buffers. Another, minor distinction is the order in which the capital needs for the production floor and the debt ratio are estimated. The latter distinction has an effect on the minimum required capital allocated to these two groups, but not on the overall effects.

The rule-making system of the Basel Committee is critical to the banking sector and financial structure, and also national economies and society as a whole. As a result, the process has piqued the interest of an unusually broad range of organizations and observers.

Significant changes were made to the final guidelines, which were published in September. Basel III, in particular, now provides a timetable for gradually implementing the revised legislation. The issue now is how well and how fast banks will be able to adapt, considering their earning power, mitigation capabilities, and capital-raising capability. As a result, we have revised three of our previous impact analyses. First, we considered the final changes from July and September, which reduced deductions for minority stakes, reinstated a limit on the recognition of deferred tax assets (DTAs) and shares sold by financial institutions, and changed liquidity and financing conditions. Second, we have included some significant national “add-ons” that are either already agreed (such as Switzerland's decision to implement even greater financial proportions) or generally predicted (such as the United Kingdom's imposition of greater financial proportions).

Finally, I have included a complex viewpoint that involves two reforms that will have a material effect on banks: long-term balance-sheet trends, such as the consolidation of retained earnings and the phase out of DTAs and secret losses, and the requisite balance-sheet expansion to sustain planned credit growth.

2.1 EFFECT ON EUROPEAN BANKS' CAPITAL

Assuming complete adoption of all Basel III steps by 2030, and before any corrective acts by banks, the pretax ROE of European banks will fall by between 3.7 and 4.3 percentage points from the pre-crisis average of 15%. The effect of the net stable funding ratio (NSFR), the current law governing long-term funding, is excluded at the low end of the spectrum. The NSFR as described today is at the upper end of the spectrum. 6 It should be remembered that the NSFR consultation is still ongoing, and the finalized ratio is generally predicted to be less draconian.

The consequences will be felt steadily. We examined the different transition times and determined that the decrease in ROE would be 0.3 percentage points by 2024 and 2.1 percentage points by 2027.

The decline in ROE is primarily due to capital and funding impact. Capital value will account for 0.8 percentage points of the widely adopted (by 2021) effects, increased risk-weighted assets (RWA) will compensate for 1.3 percentage points, and increased capital ratios will compensate for 1.3 percentage points (including 0.3 percentage points for new minimum ratios, 0.8 percentage points for additional cushion, and 0.2 percentage points for more national diversion). ROE would be reduced by 0.1 percentage point according to the leverage ratio. In the funding hand, the risk of keeping more liquid assets will cost 0.2 percentage points, and the cost of holding more long-term capital will cost 0.6 percentage points. We go into both of these in more detail below.

Capital impact

The magnitude of the capital deficit caused by higher capital ratios is strongly dependent on the assumed target ratios. We utilized regulatory ratios of 4.5 percent for core Tier 1 and 6 percent across all Tier 1, as well as the mandatory core Tier 1 conservation buffer of 2.5 percent. Furthermore, we assumed a cushion above and below the regulatory minimum in order to meet market, target ratios of 9 percent core Tier 1 and 11 percent Tier 1. This 2 to 2.5--percentage point cushion accounts for 55% of the projected shortfall. We assume it is a reasonable estimate; traditionally, banks have kept approximately 4 percentage points higher than the statutory minimum of 4 percent Tier 1 capital. This cushion would undoubtedly shrink in light of the required regulatory buffer, but we believe that each bank will retain at least one percentage point of cushion, with some holding up to three or four percentage points, particularly if additional "too big to fail" conditions are levied on large banks.

We have taken into account national discretions for Switzerland and the United Kingdom individually. We projected a 12 percent core Tier 1 ratio and a 20 percent total Tier 1 ratio, including contingent resources, for the two major Swiss banks; this constitutes a one-point reserve on top of the Swiss Expert Commission's recently suggested minimums. In light of comments by UK regulators that they will certainly demand more than the Basel III minimum, we assumed a 12 percent core Tier 1 ratio and a 15 percent Tier 1 ratio for UK banks. We did not have any additional conditions for systemically relevant banks, which were addressed but not resolved at the G20 summit in Seoul.

Based on these estimates, Europe's gross capital deficit in 2019 will be about €1.1 trillion. This is a €100 billion boost from our previous estimation in April 2010, as higher target proportions overshadow some positive improvements, such as less capital deductions and a shift in the classification of over-the-counter (OTC) derivatives.

Interestingly, for our sample of top European banks, the leverage level expressed in Basel III would not be a big restriction, contributing little to the conditions levied by the risk-based ratios. Of course, this can vary for particular actors (for example, specialist public finance lenders) as well as banks planning a targeted deleveraging of high-risk assets.

After taking into account EU-specific changes, the findings of the Basel III capital monitoring exercise indicate that the minimum Tier 1 capital threshold for European banks will rise by 15.4 percent at the complete implementation date (2028). Except the effect of the leverage ratio, the effect of the changes is 18.3 percent, with the production floor (6.2 percent) and liquidity risk being the most important considerations (5 percent). The minimum Tier 1 capital threshold for major and globally engaged banks (Group 1) will rise by 16.2 percent. The requirements for global systemically relevant organizations (a subset of Group 1) and Group 2 banks will increase by 23% and 11.1 percent, respectively.

Change in total T1 Minimum Required Capital, as percentage of the overall current Tier 1 MRC, due to the full implementation of Basel III (2028) (weighted averages, in %)

Bank group	Credit risk			MR	CVA	Op Risk	Other Pillar 1	Output floor	Total risk-based	LR	Total
	SA	RB	Securitisation								
All banks	2.2	2.4	0.4	0.6	3.0	3.8	-0.3	6.2	18.3	-2.8	15.4
Group 1	1.9	2.2	0.4	0.7	3.2	4.1	-0.4	7.0	19.1	-2.9	16.2
Of which: G-SIIs	2.1	3.5	0.6	0.5	3.1	6.2	-0.2	6.8	22.6	0.4	23.0
Group 2	4.4	3.3	0.0	0.4	1.5	2.3	0.0	1.9	13.8	-2.7	11.1

To comply with the new structure, EU banks may need an additional EUR 9.4 billion in Tier 1 capital. These projections are based on the premise that all Basel III conditions are fully met.

- The Basel III Survey Report evaluates the effect on EU banks of the final revisions to credit risk, divided into four sub-categories, operating risk, and leverage ratio structures, as well as the implementation of the aggregate production floor. It also calculates the effect of emerging business risk (FRTB) requirements and credit valuation changes (CVA).

- The Basel III reporting exercise report's combined effect analysis employs a sample size of 106 banks.

- The Basel III capital monitoring study breaks down the findings for Group 1 and Group 2 banks individually. Group 1 banks have Tier 1 capital in excess of EUR 3 billion and are globally active. The other banks are classified as Group 2 institutions.

- The findings demonstrating 'reduced prediction bias' assume little difference between the existing and updated market risk frameworks for three Global Systemically Important organizations that are outliers due to unnecessarily optimistic expectations under the revised market risk paradigm. Based on the initial conservative estimates, the overall impact will be 16.7 percent, with a total risk-based impact of 19.7 percent and a business risk impact of 2.3 percent, according to the "conservative estimate."

- For the first time, an interactive tool displaying the key conclusions is made available alongside the Report for analytical purposes. The public Basel III reporting Report contains the government estimates and findings. As a result, any analysis based on the data presented by the visualization tool should be approached with caution.

- Centered on the same reference date, the EBA will also issue a more comprehensive ad hoc Report on 15 December 2020 in response to the European Commission's Call for Advice (CfA) on Basel III (December 2019). The current Study's composite findings are not exactly analogous to those of the CfA report since they are based on significantly differing samples in structure and scale, as well as two major methodological variations. The most significant methodological distinction is the use of multiple buffers. Another, minor distinction is the order in which the capital needs for the production floor and debt ratio are estimated. The latter distinction has an effect on the minimum required capital allocated to these two categories, but not on the overall effects.

Funding impact

We forecast that the overall short-term financing deficit caused by the current liquidity coverage ratio (LCR) will be around €1.3 trillion. This is about 40% of the average liquidity cushion kept by banks today. The NSFR has resulted in a deficit of about €2.3 trillion in long-term financing for Europe's banks, which is equal to approximately 10% to 15% of the presently offered funding. The two results are intertwined; when banks restore their long-term funding, for example, this accumulation reduces their short-term liquidity requirements.

2.2 Comparing impact in Europe and the United States

At first glance, the effect on US banks is close, though somewhat smaller; of note, the US banking sector is also smaller in terms of assets than Europe's. With the same conditions, we predict a $700 billion shortfall of core Tier 1 resources in the United States, or €500 billion at current exchange rates, and an $870 billion shortfall in overall Tier 1 capital, or around €600 billion. We measure the United States' long-term funding deficit to be $3.2 trillion, or €2.2 trillion. These shortfalls would have an effect on profitability; the US banking industry's ROE would drop by around 3 percentage points. The leverage ratio expressed in Basel III will not be a significant extra limitation since the United States already has one in place.

When you look closer, you will notice a few main variations. In terms of capital, the reduction of mortgage servicing rights is more important in the United States than in Europe, although minority interests are less important.

Because of the two industries' somewhat different starting points, the influence of Basel III's RWA-related interventions is not strictly comparable between Europe and the United States. Many banks in the United States are yet to enforce Basel II. The parallel moves to Basel II and III can have a greater impact on capital levels in these banks. However, it is impossible to foresee the additional effect this would have on the capital needs of the US banking system from the outside.

In terms of financing, the 40 percent ceiling in the LCR on loans provided by public-sector agencies, the assumed drawdown limits on business and financial credit and liquidity tracks, and the assumed runoff rates of wholesale deposits are the most important considerations in the United States.

2.3 A dynamic perspective on European banking

The image shifts in our complex view, which takes into account balance-sheet trends until 2019, such as the phaseout of deferred tax assets (DTAs) or undisclosed losses, the consolidation of retained profits, and increases in business balance sheets (Exhibit 2).

Recent trends in bank capital endowment affirm this complex viewpoint. We can see that the deficit in core Tier 1 capital has already decreased by approximately 10% for the 22 banks in our sample that posted reasonably comprehensive figures for the second quarter of 2010. Though RWAs remain virtually stagnant, banks record higher common equity, less unrealized profits and losses in available-for-sale assets, and lower cash-flow hedge reserves. DTAs also increased marginally.

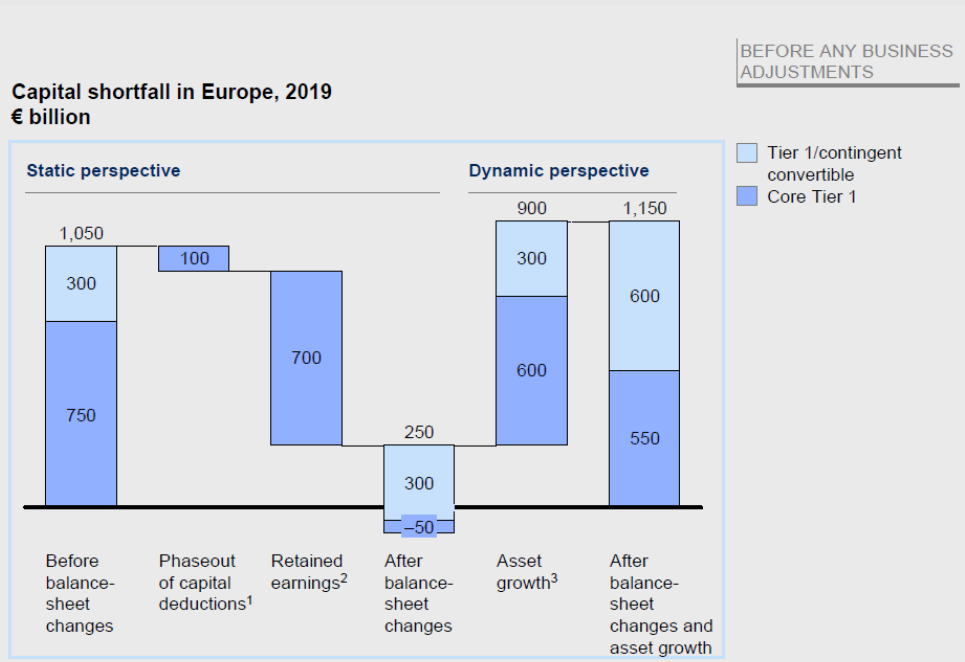
The financial influence

We accounted for certain shifts in our dynamic perception and discovered that the industry's demand for additional resources will rise by around 10%, from €1.1 trillion to €1.2 trillion. This €100 billion rise is the result of a number of positive and negative results. To begin, some of the things that Basel III would subtract from resources, such as DTAs and secret losses, are expected to become effectively obsolete by 2019. This will result in a €100 billion reduction in the estimated capital deficit. Banks will also be able to meet some of their capital requirements with retained profits. We expect these to be about €700 billion over the next ten years, estimating a 0.6 trillion average return on assets (ROA), a 30% tax rate, and a dividend payout ratio of 50%, both of which are comparable to pre-crisis levels.

Company expansion, on the other hand, would expand the demand for capital by nearly €900 billion, to a total of €1.2 trillion. This forecast is based on McKinsey's long-running analysis on Global Banking Pools and expects nominal annual balance-sheet growth of 3% through 2019. According to Global Insight, the main underlying expectations are that nominal GDP will rise by 3.5 percent per year in Western Europe. Deleveraging would reduce the rate of growth of bank balance sheets to 3%, especially in Germany, the United Kingdom, and France. Our growth assumptions, on the other hand, do not involve broader market restructurings in reaction to Basel III, such as those mentioned below, the effect of which on growth cannot be measured at this time.

Exhibit 2

In our dynamic perspective, capital shortfall gets worse.



1 Assuming no deferred tax assets or unrealized losses on balance sheets in 2019.
2 Assuming return on assets of 0.55%, dividend payout ratio of 50% (pre-crisis averages of top European banks), and tax rate of 30%.
3 Assuming nominal balance-sheet growth rate of 3%, after deduction of additional growth implied retained earnings (~€200 billion).

Source: Annual reports; bank filings; Global Insight; McKinsey Global Banking Pools; McKinsey analysis

Effect of funding

The dynamic viewpoint will, of course, see a shift in the need for capital and liquidity. For the same balance-sheet arrangement as before, the short-term liquidity gap will rise from €1.3 trillion to €1.7 trillion. Similarly, the long-term financing gap will grow from €2.3 trillion to €3.4 trillion. As previously stated, a boost in long-term financing would cover a significant portion of the short-term liquidity deficit.

2.4 Effect on commerce sections

No estimation of the effects of Basel III will be complete unless the effect on profitability of individual companies and the bank as a whole was included. Three forms of influence must be addressed, as indicated in our April 2010 white paper:

- **Corporate-level balance-sheet influence** that cannot be applied to particular companies. Capital deductions, for example, would impact each bank's balance sheet slightly based on the holdings, but would have little effect on businesses.

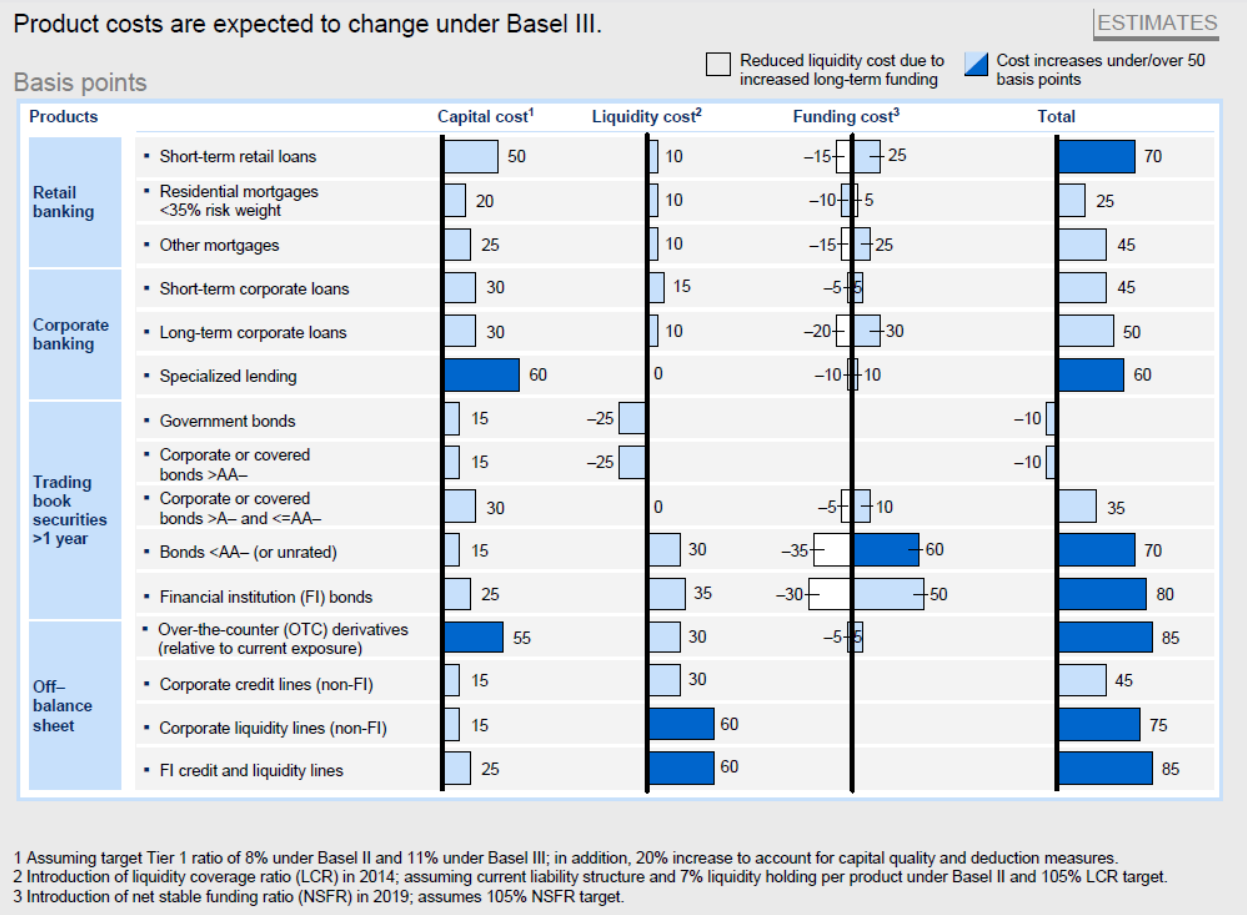
- **Widespread effect on both banks and companies**. The updated capital and debt ratios are the best examples of laws that have a proportional impact on all firms. The effect would be more severe on moderately profitable companies, but all businesses would lose if the cost increase could not be passed on to consumers.

- **Effect on the company.** This group covers guidelines on risk-weighted assets (RWAs), liquidity, and long-term financing that were expressly intended to resolve the threats that were apparent during the recession, such as in trading and securitization.

We use a commodity perspective to evaluate these three types of effects on the major market segments—retail, corporate, and investment banking. We take adjustments in capital expense, liquidity cost, and long-term financing cost into account and quantify the corresponding increase in the cost of making goods in each segment in basis points (exhibit). The long-term funding necessity net stable funding ratio (NSFR)—as published today drives the upper limit of the ranges given below; as previously stated, adoption as currently written appears impossible. This is especially relevant in the following debate, as the long-term funding ratio is a major cost driver for certain products, particularly corporate products, cash trading operations, and low-rated and financial institution bonds. The figures below reflect the additional costs for banks and do not take into account any potential solutions.

Any logical responses are now in place for all three segments—retail, business, and investment banking. Banks will, of course, offset some of the effect by cost-cutting initiatives, capital-efficiency initiatives, de-risking, and pricing changes. Our experience indicates that rates will most likely rise in some markets and industry sectors, most notably in some corporate lending markets, so although, like many retail banking European markets, any pricing changes will be subject to the competitive climate and therefore constrained.

When banks contemplate the cost increases outlined below, the consequences for their earnings would be a primary factor. If they aim to manage sustainability and adapt to the current regulatory climate, this should be the starting point for an evaluation of the effect on their various companies.



2.5 Retail banking

The sections of Basel III that influence the whole bank, especially higher capital and liquidity requirements, have the greatest impact on retail banking. Retail banks will be particularly affected by the new capital ratios, as most have been operating with lower capital ratios than wholesale banks in recent years. Capital quality controls, like that of the elimination of silent involvements in Germany, would also have a major impact on certain retail establishments. Also after being reduced in the July 2010 Annex, liquidity conditions will still be a consideration.

The impact of Basel III's current product-specific specifications is marginal. The current market-risk structure would not extend to the retail sector, and the new funding criteria raise no special obstacle following the July 2010 Annex changes, which established that deposits are now widely recognized as long-term funding and substantially lowered long-term funding requirements for mortgages. Residential mortgages only require 65 percent long-term financing, while previous iterations of the rules required 100 percent.

The rate of short-term retail loans would rise by up to 70 basis points. This impact is mostly caused by an improvement in target ratios for a market with comparatively high-risk weights; however, increased liquidity and long-term financing requirements would also lead to higher costs. Given the comparatively

high margins on these items, banks will be able to pass these on to consumers in certain situations, as discussed above. Repricing can be problematic in some consumer finance segments.

2.6 Corporate banking

Corporate banking, like retail banking, may be largely influenced by the corporate impact of higher capital target ratios. The updated ratios would also have an effect on certain traditional corporate banking goods. Long-term corporate loans and long-term asset-based lending sectors (commercial real estate, project finance) would see a 10-basis-point rise in borrowing costs. Undecided credit lines to financial companies and undecided liquidity lines to all financial institutions and corporates would see a cost boost of 60 basis points alone for higher liquidity needs, plus 15 to 25 basis points for higher underwriting standards. Banks could be unable to entirely pass on these cost changes due to the price sensitivity of some business loan markets. If they cannot, the increased costs would result in lower profits and, ultimately, less money available to these companies.

Other goods will be impacted as well, especially those with comparatively high risk weights, such as structured financing or unsecured loans, which will be particularly hard hit. Admittedly, specialist lending (including managed finance and trade finance, along with other businesses) is expected to rise by around 60 basis points as a result of the current target ratios.

The trade finance industry deserves particular attention because it is impacted by many aspects of the current system. First, Basel III raises the risk weighting for financial institutions from 20% to 30%. Lending between financial institutions is a critical component of trade finance, with banks often serving their customers, usually through letters of credit. Second, trade-financing contributions are now counted in full against the current leverage ratio, a fivefold improvement on today's capital ratio criteria. Eventually, as previously said, the new liquidity rules are intended to provide buffers against off-balance-sheet liquidity lines such as letters of credit and exchange guarantees.

2.7 Investment banking

Of the three segments, Investment banking and, in particular, capital markets face the most product-specific shifts, and are, of course, impacted by the higher target ratios. The emerging market-risk and securitization framework, the changed liquidity of shares due to the launch of the LCR, and major changes to the OTC derivative industry had the most impact on goods. Overall, trading companies will be the most affected and will need the most scrutiny. Consider three basic activities: OTC options, cash dealing, and securitizations:

- **OTC options** are derivatives that are traded on the open market. Both behaviors can be influenced in two ways. First, under the European Union's Capital Requirements Directive III (CRD III), the stressed valuation at stake, the incremental risk fee (IRC), and the comprehensive risk measure (CRM) for correlation trading would enable banks to keep more capital for market danger. Second, under CRD IV, recently adopted credit valuation changes (CVAs) would enable banks to retain more reserves for counterparty credit risk. Despite the July 2010 Annex's mitigation, the CVA specifications remain large. CVAs, we predict, will boost RWAs by a factor of three, on top of the impact of improvements in the market-risk system. Together with higher liquidity costs and decreased liquidity gains, this could result in a rise in costs by up to 85 basis points on the market valuation of unnetted, uncollateralized positions on average—a substantial increase. Trades with lower-rated counterparties and trades with counterparties with minimal netting capacity will be the most impacted; sales of risk-management goods to corporations come to mind. To retain profitability, banks will need to pay for these costs by a combination of increased liquidity and netting structures, more aggressive central counterparty management, and transferring certain companies and goods to central counterparty clearing mechanisms outside the bank.

- **Trading in cash.** The higher cost of keeping inventories, especially the matched funding needs on lower-rated reserves, would reduce the profitability of cash trading. These will increase by 20 to 40 basis points. If we conclude that inventory turnover at a large “flow” house is between 4 and 50 times per year, these higher costs will result in a 1 to 10 basis point expansion of bid-ask spreads. Furthermore, as previously said, cash trading would face higher hedge costs from OTC derivatives. Since these costs cannot be passed on, one possible outcome is that any market-making is abandoned, and market scope and liquidity are diminished, increasing bid-ask gaps and perhaps driving some trading activity to exchanges.

- **Securitizations.** The securitization industry deserves special attention. Securitizations are affected by all three Basel Capital policy amendments—CRD II, CRD III, and CRD IV. Overall, these reforms have the potential to increase capital requirements by a factor of ten.

  CRD II (which predicts a portion of Basel III which is set to go into effect by the end of 2010) allows investors to ensure that, before they can purchase a piece of a new securitization, the originator has complied with the “skin in the game” law, which requires banks to retain at least 5% of the securitizations they produce at all times. Banks will hold either a first-loss or a

"vertical" slice through the tranches of the securitization. The effect on capital needs could be up to 500% in the case of the first-loss item and about 50% if they chose a vertical section.

CRD III, which applies to Basel II, adds business risk capital costs and higher resecuritization fees. This have been extensively discussed elsewhere, and the consensus estimation of a threefold rise in capital remains accurate.

CRD IV, which refers to Basel III, involves a seemingly technological improvement that turns out to be important. Securitizations with a poor ranking (below BB-) is usually deducted from capital under Basel II (50 percent was allowed as Tier 1 and 50 percent as Tier 2). Instead, Basel III assigns a risk weighting of 1,250 percent to such securitizations. When combined with the recently increased capital ratio, these results in considerably higher capital requirements—40% to 100% higher for capital deduction products, based on which regulatory minimum or sector target ratios are regarded. In particular, in certain situations, the requisite Tier 1 capital will be greater than the securitization's nominal value. It is unclear if this is the regulator's goal, or if the regulation will be amended.

Banks must evaluate their total liquidity, resources, and leverage status to ascertain how many of the new mandates can be fulfilled internally, such as by raising extra capital and funding from existing companies, as well as externally from capital markets. Since these resources limit them, their attention will invariably shift toward leaving the least appealing firms, as determined by return on risk-adjusted investments, even though the company is meeting its internal hurdle threshold.

CHAPTER 3 HOW BANKS Will REACT

3.1 Moves without regret

Most banks initiated ambitious programs to strengthen capital and liquidity management in reaction to Basel II and the financial crisis. Given the critical value of finance, liquidity, and financing performance under Basel III, these organizations should stay the course, if not redouble their efforts. Basel III significantly raises the stakes for banks who are yet to improve their strategy by making funding and liquidity much scarcer and more competitive.

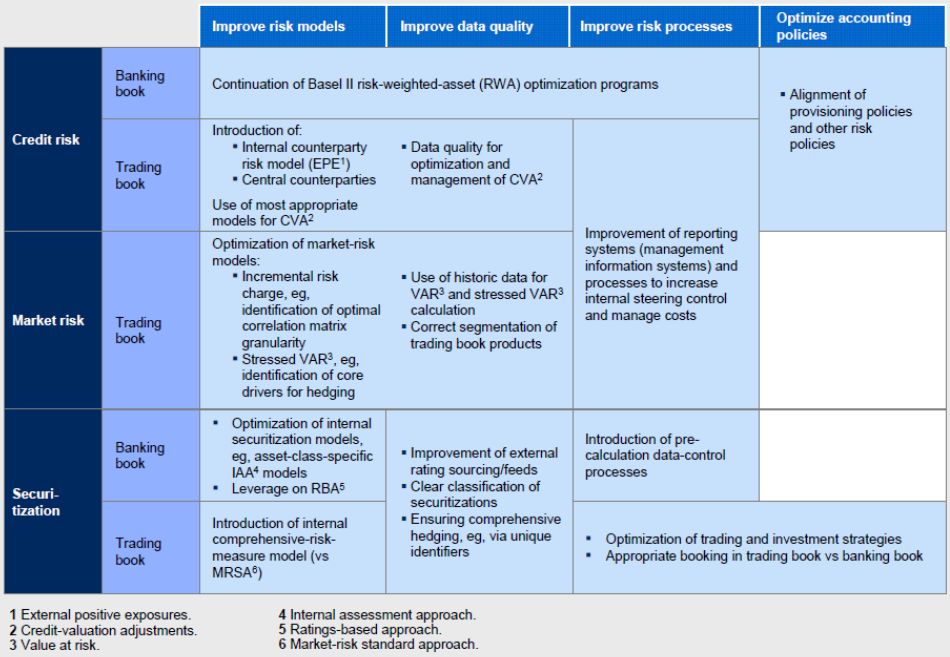
Consequently, banks would be particularly worried about the loss of capital and liquidity that will occur from inefficient enforcement of the new legislation. In this regard, we see two main steps that banks should take to directly respond to Basel III challenges: increase capital performance, particularly in the trading book, and correct suboptimal liquidity-management practices.

Increase resource performance

Many of the capital-efficiency creating challenges through banks in recent years will continue to be relevant in the Basel III environment. Banks will use this time to reassess what they have done so far and determine further corrective steps. We will not address the established Basel II levers in this article, except to mention that even organizations that have successfully adopted a robust RWA optimization program can realistically hope to accomplish another 5% to 10% increase. Instead, we are concentrating on new strategies that, based on our current findings, have the potential to improve resource productivity under the new Basel III system.

Exhibit 4

Selected examples can be culled from the capital-optimization matrix.



		Improve risk models	Improve data quality	Improve risk processes	Optimize accounting policies
Credit risk	Banking book	Continuation of Basel II risk-weighted-asset (RWA) optimization programs			▪ Alignment of provisioning policies and other risk policies
	Trading book	Introduction of: ▪ Internal counterparty risk model (EPE[1]) ▪ Central counterparties Use of most appropriate models for CVA[2]	▪ Data quality for optimization and management of CVA[2]	Improvement of reporting systems (management information systems) and processes to increase internal steering control and manage costs	
Market risk	Trading book	Optimization of market-risk models: ▪ Incremental risk charge, eg, identification of optimal correlation matrix granularity ▪ Stressed VAR[3], eg, identification of core drivers for hedging	▪ Use of historic data for VAR[3] and stressed VAR[3] calculation ▪ Correct segmentation of trading book products		
Securi-tization	Banking book	▪ Optimization of internal securitization models, eg, asset-class-specific IAA[4] models ▪ Leverage on RBA[5]	▪ Improvement of external rating sourcing/feeds ▪ Clear classification of securitizations ▪ Ensuring comprehensive hedging, eg, via unique identifiers	Introduction of pre-calculation data-control processes	
	Trading book	Introduction of internal comprehensive-risk-measure model (vs MRSA[6])		▪ Optimization of trading and investment strategies ▪ Appropriate booking in trading book vs banking book	

1 External positive exposures.
2 Credit-valuation adjustments.
3 Value at risk.
4 Internal assessment approach.
5 Ratings-based approach.
6 Market-risk standard approach.

Exhibit 4 provides a variety of ideas for avoiding capital waste in credit and market risk, as well as for securitization, some of which are outlined below:

Establish credit-risk structures as well as core counterparties to the trading book. Some of the world's largest banks are actively working to boost their trading book capital performance through the implementation of internal counterparty risk and credit valuation adjustment (CVA) models, unified counterparty management, and increased use of central counterparties. In our analysis, the latter is especially capable of lowering RWAs, particularly for banks with large portfolios of standardized items. Moreover, when deciding to switch to central counterparties, banks should strike the right balance among lower margins and capital relief.

Improve market-risk models by providing a robust risk measure. Market-risk models will see the most improvements in the short term, owing primarily to the addition of the pressured value at risk (VAR). Identifying the key factors of market risk in their portfolio and hedging them to diminish stressed-VAR exposure would be a must-do for all banks with substantial trading-book operations. This can be achieved with whole portfolios, sub portfolios, or even specific roles.

Furthermore, by implementing the comprehensive risk measure (CRM) internal model, certain banks can be able to decrease the capital needs of their correlation trading market. However, since CRM implementation is subject to supervisory scrutiny, including stringent qualitative and stress-testing criteria, banks would have to find their best point of balance between the value received and the substantial implementation commitment involved.

Enhance loan-loss reserves. In the banking book, banks can improve the consistency of their loan-loss provisions (LLPs) by removing shortcomings in existing methods and models, particularly inaccuracies that create overly large buffers. There will be two facets to this: enhancing provision performance, particularly the quality of the original data, and incorporating “through the cycle” figures. On the first stage, we have seen organizations with inadequate data quality on collateral, for example, and overly complex provisioning processes minimize LLPs by up to 30%. In our analysis, banks that use a through-the-cycle method for probability of default (PD) and estimated losses (EL) will improve the accuracy of provisions while reducing uncertainty in their forecasts. However, recalibration of Basel II frameworks necessitates a major deployment effort.

Overall, the amount and form of applicable levers, as well as the associated capacity, vary considerably by organization, depending on the bank's initial asset structure (for instance, trading vs banking book, the comparative weight of securities in the trading book, etc.) and the degree to which these steps have already been effectively applied.

Improve the liquidity and finance management.

The effective application of Basel III liquidity and financing criteria would be a critical tool for improving risk control in this field while also mitigating some of the existing consequences. There are three improvement levers that can be defined. Some more sophisticated banks already use one or two, but to the best of our understanding, none of them use all three on a regular basis.

Significantly raise the centralization of liquidity management at the organizational level.

Centralization of liquidity and funding management, including centralization of counterparty credit risk management, is a crucial lever for managing a bank on a centralized, netted basis, reducing the need to collect funds in the market. While several larger banks have already developed strong central treasury roles, others are still in the process of centralization,17 most notably by controlling liquidity risk and coordinating access to foreign and local markets through a dedicated "liquidity manager."

Create a more detailed picture of the bank's liquidity situation using an automated dashboard that includes cash-flow estimates, maturity ladders, portfolio analysis, funding diversification statistics, stress tests, and other features. Banks that lack advanced tracking and reporting software are often forced to make cautious (often-costly) calculations of their requirements. Banks who use these instruments, on the other hand, have a solid understanding of their liquidity requirements (for example, by using 8-to-12-week cash-flow estimates focused on sophisticated behavioral models) and a clear understanding of their risk status. (For instance, using stress simulations to simulate how cash flows will behave in the event of adverse risk events like systemic shocks, ranking downgrades, etc.) Upon the basis, these banks may fulfill the prerequisite for accurately identifying their liquidity position under the new LCR regime, including avoiding liquidity spoilage across the group (for instance, from large fluctuations in the daily financial situation) and adjusting their short-term asset and liability framework to the new regulations by improving their budgeting and pricing mechanisms.

Develop the financing strategy as part of the overall corporate planning framework by establishing a clear and iterative connection to the capital investment process in order to mutually maximize assets and liabilities. Best-practice banks often have multiple alternate financing plans in place and can track them in order to capitalize on occasions where their marginal risk-adjusted return on assets approaches the cost of funds. Considering the significantly higher need for long-term funding and the associated cost increase for banks, as well as the funding constraints in the strategic planning and in deciding the quantity of acceptable funding gaps above one year, the need for long-term funding and potential contingency plans over a fully matched approach as suggested by the new system would have to be a critical factor.

3.2 Balance-sheet rebuilding

For several banks, capital deductions account for a sizable portion of Basel III's effects. Unless they will increase the efficiency of their capital, they would now have to subtract many types of capital on which they depended under Basel II.

Second, the latest Basel III architecture is based on streamlined commodity, resources, and financing management. Banks can no longer continue to optimize assets and liabilities separately in a Basel III environment. In fact, the current interdependencies mean that each asset affects the bank's capital and debt status, and each asset and responsibility affects the bank's short-term liquidity position as part of its properties. This is not just a technological issue; with rating agencies and financial analysts paying more attention to banks' balance sheets, it is a strategic one.

As a result, we believe that enhancing capital efficiency, better balance-sheet control, and lower long-term financing costs are three critical components of successful balance-sheet reform. This can encourage banks to offset up to one percentage point of lost ROE.

Deductions and capital quality

The guidelines for capital quality in Basel III differ significantly from those in Basel II and have no leeway:

- Banks would also subtract the resources of their insurance subsidiaries above a 10% threshold; eliminating the ability, they have had in previous years to use a substantial portion of this equity to support the combined entity's banking operation. They would therefore exclude the minority surplus capital of banking branches.

- Banks would exclude the valuation of any defined-benefit pension scheme asset, as well as any shares in unconsolidated financial institutions that exceed a 10% level.

- Banks must exclude all deferred tax assets resulting from net loss carry-forwards, with certain exceptions for DTAs resulting from timing gaps between the tax balance and the financial balance.

Banks have to try to increase the valuation of their resources in order to see as much of it recognised under the new regulations as possible. In this case, banks have a number of choices for greatly mitigating the effects of Basel III:

- Banks can leverage the scope of their combined capital by, for instance, purchasing minority stakes (in accordance with their overall portfolio strategy) or reducing the surplus cash of banking divisions.

- Furthermore, banks can leverage their stakes in financial companies by, for example, reducing unconsolidated shares below the regulator's capital deductible thresholds.

- A further stage: banks should review pension contracts with their actuaries and advisors to get a better understanding of the amount of pension funds that can be effectively and quickly removed from the scheme and thereby become available for regulatory capital approval.

- Eventually, banks should thoroughly examine their deferred tax resources and then justify their portfolio of these assets in terms of both structure and volume.

Regulation of the balance sheet

Banks will need to invest in ongoing balance-sheet management skills in addition to the one-time initiative to align the balance sheet to the current financial regulations. Many banks still have a corporate-level view of the balance sheet and little insight into balance-sheet use across business lines; consequently, they can only incentivize balance-sheet use by a funds flow-pricing scheme. Banks should use tools similar to those used to enhance their financing strategy, as discussed above, to greatly improve the efficiency of systemic balance-sheet control. Even so, since the current leverage ratio requires all balance-sheet elements to be considered, banks can need to implement new programs, balance-sheet instruments, and KPIs. Given the disconnect between many front-office processes and tools and balance-sheet data, this could pose a major problem for banks.

Long-term operating expenses have been reduced.

To meet the new NSFR goal, banks will need to expand their stable funding base across three levers: enhanced deposit gathering, secured funding methods, and better investor coverage to support them locate unsecured issuances.

Deposit-gathering activities should concentrate on expanding and stabilizing the deposit base rather than competing on costs, which would not result in long-term funding benefits. One-step that banks should take is to use clever bundling of items, such as enabling partial interest offset between loans and deposits. Another strategy is to incorporate organized payoffs and bonuses into their offerings in order to reduce the outflow of funds to off-balance-sheet vehicles.

Furthermore, banks must ensure that all potential reserves are held in covered bonds and structured for quick securitizations. This would assist them in reducing their dependence on unsecured financing as well as their funding costs. Although securitization markets remain relatively illiquid, the recent success of some particular asset classes that offer greater liquidity, high collateralization, and straightforward arrangements suggests that there could be considerable future opportunity.

After all, for most banks, these two actions will not suffice, and they will need to concentrate on restoring their investor base for unprotected issuances. Banks should be more transparent with these customers. Their investor attractiveness should include the bank's enhanced risk status following the issuance, as a consequence of both higher capital ratios and improved risk procedures.

It should be remembered that all of these initiatives are at risk of being legislated away, and not all banks will be able to completely use them, making it critical that banks take advantage of them while they can in order to ensure the reliable financing they need.

3.3 Adjustments of business models

The new Basel agreement reflects the kind of discontinuity that strategists seek. Banks have a chance to revisit their portfolio of companies and their respective business models. Few banks have started to examine their company portfolios to determine the relative value of each and the implications for the portfolio of keeping it. This can be achieved from the top down, focusing on an in-depth understanding of how new resources, liquidity, financing, and leverage considerations impact each category and commodity. Understanding the ties, interdependencies, and trade-offs across market segments would be critical. This are not the subject of this paper since they are exclusive to each bank.

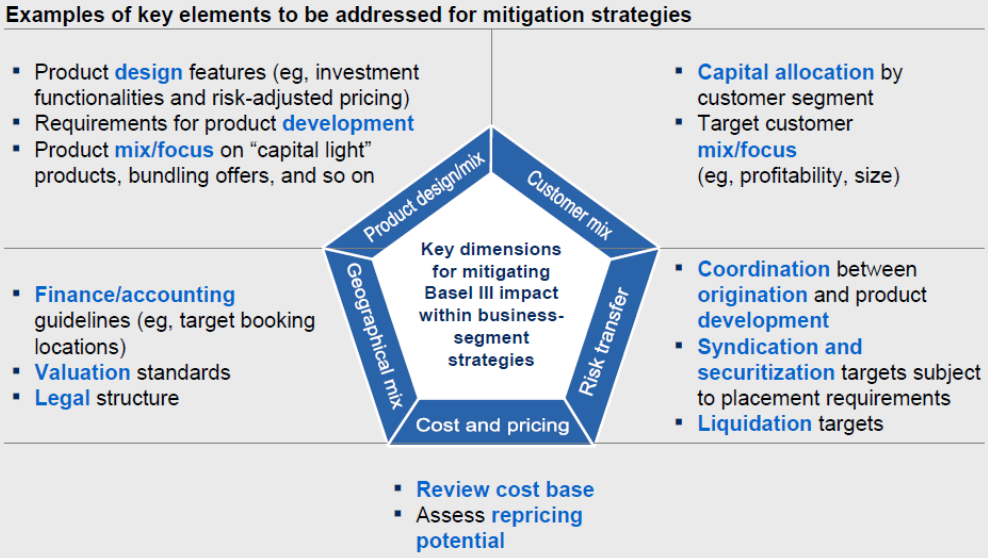
If the analysis is completed, the companies that remain in the portfolio may need a program to adapt their business strategies to the current reality; the steps summarized in the previous sections will only resolve a portion of the viability gap. Any companies can only undergo minor changes, while others may be significantly impacted. Stock markets and trading companies, for example, could be severely hampered because of the current capital and financing conditions. In the sections that follow, we will explain some of these business-segment-specific aspects along the dimensions depicted in Exhibit 5.

Product development/mixing

Banks will consider redesigning impacted goods in order to continue meeting customer demands while still leveraging the bank's resources and liquidity. Banks, for example, can have transaction accounts with investment capabilities. According to the new concept of the NSFR, such accounts would benefit from steady funds and thus be given a higher ranking in this ratio. In general, it is important to ensure that all short-term investment funds are kept in stable accounts. In this respect, banks must also ensure that risk-adjusted pricing is used on all goods in order to adequately account for their risk, cash, and liquidity costs.

Exhibit 5

Mitigation strategies within specific businesses should be developed around five core components.



Banks can also change their product selection to meet the same objectives. Several considerations are also being made in this direction. Banks, for example:

- should expand their emphasis on "capital light" goods that continue to satisfy consumer demands while requiring less capital. Banks have not taken advantage of these possibilities in a systemic manner; one example is working capital finance, where banks can substitute factoring for receivables financing and cut RWAs by nearly half.

- They could launch deals for product packs that combine lending and deposits, such as retail mortgages with interest payments on the net balance of remaining credit and deposit—something that is already popular in some countries—as well as special offers to encourage more flexible finance in the form of retail and small and medium-sized business (SME) deposits.

- Banks will lower borrowing costs by increasing the proportion of short-maturity loans. Offering more revolving loans and less corporate mortgages is one example.

- Institutions could translate corporate loans into corporate bond issuance for big, high-quality customers, replacing RWA-heavy net interest income with RWA-free fee income.

Customer demographics

Furthermore, banks are likely to conduct a periodic analysis of their capital distribution to each customer segment to ensure that capital is preferentially distributed to segments that deliver better returns (adjusted for risk, capital, and financing costs), provided that these segments can be effectively served by the bank. In addition to the conventional viewpoint that takes into account segment growth and economics, the attractiveness of client segments would be evaluated based on factors such as necessary resources and financing.

Following such an assessment, banks may decide to reduce business with customers who do not add economic value (particularly corporate customers), i.e., those customers who account for a large portion of the bank's RWAs but do not return the cost of capital. Similarly, they would try to attract more business from low-default clients and will need to build tailored acquisition techniques to do so. Finally, banks may consider ways to "reinter mediate" their investing customers by converting at least a portion of their customers' investment portfolios to deposits.

Shift of risk

Banks would aim to develop their risk-transfer capabilities in three ways. One strategy is to strengthen collaboration between the lending company and product growth, so that both teams are committed to increasing the amount of credits that can be securitized, distributed, or syndicated. Contract standardization is critical in this case, particularly when it comes to maturities. Incentive programs may aid in increasing the degree of such collaboration.

Another method of risk shifting is for the bank to expand its network of syndication and securitization partners, both globally and through business. Banks should seek out government money, insurance firms, and other buyers in order to strengthen their capacity to sell into secondary markets. The return of nongovernmental investors like private equity firms and hedge funds may provide additional opportunities for risk transfer.

Syndication, club offers, and private placements have all proven to be robust in the face of the crisis. As a third step, banks must strengthen their investment banking skills for these channels in order to properly manage asset volumes and exposures.

Geographical complexity

Banks, especially the largest ones with operations in several countries, must determine the best geographical distribution of their operations in order to reduce capital and financing needs. Historically, demand for banking services has risen in less regulated markets. Following the passage of the Sarbanes-Oxley Act in the United States, for example, some banks agreed to relocate some operations to other locations, most prominently London and Singapore. In these lines, banks must comprehend the implications of often-minor variations between locales.

A further way to maximize the regional mix is to optimize the bank's legal framework, perhaps by combining certain legal entities and forming others, and then offering incentives to customers to move to the organization that helps the bank to reduce its capital and liquidity assets.

Pricing and cost

Eventually, banks should evaluate the possible viability of their current operations in light of the expected effect of the new regulatory conditions and the mitigating options outlined above. In certain cases, banks will choose to look at ways to change rates and cut costs in order to remain profitable. If it is not enough, banks may want to explore exit plans, even if it means reducing their overall amount of operations significantly. This may be particularly true for marginally profitable banking businesses as well as hard-hit financial markets and trading businesses.

CHAPTER 4 MEETING THE IMPLEMENTATION DIFFICULTIES

As previously said, execution is expected to be complicated. In this chapter, we will examine the numerous challenges that banks face, particularly in light of their recent related attempts to comply with Basel II; approximate the expense of facing the objectives; and outline the conditions for progress.

4.1 Uncommon complexity and interdependence

Banks face many challenges, including a short timetable, heightened demands that may or may not be fulfilled, and, most importantly, unanticipated uncertainty and interdependence.

Moreover, if the current regulations will not be completely implemented for many years, new and significant monitoring provisions will go into force very quickly (Exhibit 6). The introduction of the current market-risk and securitization mechanism (as mandated by CRD III), for which banks have to be in compliance by the starting of 2012, is critical and immediate. The oversight analysis of revised remuneration plans must be done much sooner, no later than the beginning of 2011. Many other reforms, including new rules for counterparty credit risk and minimum core Tier 1 levels, as well as new treatment of banks' short-term liquidity, must be enforced by the beginning of 2013.

Policymakers are not the only ones that ought to be pleased. Capital markets and rating agencies are still keeping a close eye on things and are very likely to pressure banks, especially larger "systemic" entities, to reach enforcement ahead of schedule and to exceed their goals. Regardless of the phase-in dates, we believe that several banks will need to be in full enforcement by the end of 2012.

The implementation's sophistication could put a strain on each institution's mutual skills. However, based on their starting point, particularly the extent of their Basel II plans and expectations to develop some of the more advanced Basel III risk mechanisms, some organizations can navigate the complexities of implementation more easily than others. Design, data quality and monitoring, and processes all contribute to uncertainty. Furthermore, the interconnectedness and interdependence of the various work streams and programs poses a dynamic management problem in and of itself.

Exhibit 6

New Basel III regulation will be phased in over the coming years, but much will need to be implemented before the end of 2012.

Top priority[1]

	Key elements	Timeline: Processes and IT implemented; readiness to report to regulator	Timeline: Full compliance required
Capital	New market-risk and securitization framework	Jan 2012	Jan 2012
	Counterparty credit risk	Jan 2013	Jan 2013
	Minimum core Tier 1 ratio	Jan 2013[2]	Jan 2015
	Capital quality	Jan 2013[2]	Jan 2022
	Capital deductions	Jan 2014[2]	Jan 2018
	Conservation buffer	Jan 2016[2]	Jan 2019
Leverage	Leverage ratio	Jan 2013[3]	Jan 2018
Liquidity/ funding	Liquidity coverage ratio	Jan 2013[4]	Jan 2015
	Net stable funding ratio	Jan 2014[4]	Jan 2018
Remu-neration	Supervisory review of new remuneration policies	Jan 2011	Jan 2011
Risk IT	New requirements on risk IT	Detailed regulation in discussion	

1 Processes and IT to be implemented before the end of 2012.
2 Reporting of first increase during transition.
3 Monitoring period starts in 2011 (regulator to track underlying components and resulting ratio).
4 Not yet clear when regulator will require reporting of these ratios (dates are estimates from experts); observation period for liquidity coverage ratio starts in 2011 and for net stable funding ratio in 2012.

Style complication

Basel III takes the still difficult Basel II regime and raises it to an extraordinary degree for the banking sector. The ambiguity is seen not only in the overall legislation, but also in the main elements of the current regulation. This uncertainty has a significant influence on the crucial design decisions that banks must make on each of these items, as well as the resulting efficiency, expense, and market impact. Consider the market-risk structure and the modifications it proposes in relation to Basel II:

- Banks should also develop an integrated view of credit, relocation, and default risks for the trading book, while credit risk was previously discussed only in the banking book under Basel II regulatory capital.

- Banks must establish methodologies for measuring stressed VAR and incremental risk fee, which were not mandated by Basel II.

- Basel II included a securitization fee into the banking book. Basel III applies this to the trading book, which is much more difficult to measure and monitor due to higher numbers, higher transaction rates, and sometimes-poor data consistency.

in addition Basel III allows banks to implement new balance-sheet measures, most specifically the equity ratio and the two liquidity ratios (LCR and NSFR). Real, banks will perform a simple leverage ratio calculation using quarterly reports. Many banks, though, want to calculate leverage for each business entity, which comes at a significant expense and commitment. The LCR seems to be beyond the reach of most banks, but the NSFR necessitates an extremely thorough classification of financing sources, which is a challenging challenge.

All of this raises significant challenges to banks. While investment banks and leading multinational banks will almost certainly develop advanced calculation methodologies, those with less extensive trading-book operations will almost certainly opt for a more straightforward application of the system, aiming to strike a balance between the advantages of more complex algorithms and the increased expense. These trade-offs must be made when taking into account risk, financing, information technology, and industry.

Quality of data and monitoring complexity

High-quality data are needed for the bank's risk processes to work properly. As we have learned, ensuring this is not a simple task, and management must concentrate from the outset on specifically defining and ensuring the consistency of target data, as well as the resulting criteria for data and IT governance, procedures, and structures. The complexity emerges first and second when management is required to conduct a thorough identification of the applicable risk and finance data. They must balance the needs of several groups when determining the level of detail for each field. The risk and controlling roles, for example, need adequate information to conduct risk analysis at the customer and transaction levels, while the enforcement group's requirements are often simpler and need only aggregated details. Furthermore, they must ensure that frameworks, including disaggregation and reallocation logic, accurately map data and outcomes to enterprises. They must, for instance, be able to distribute netted RWA outcomes to trading desks. Eventually, for banks to eliminate uncertainty and avoid cost overruns, an early assessment of the trade-off between costs and advantages of alternative IT data architectures is critical.

Under Basel III, efficient market steering necessitates RWA measurement and reporting to the companies in a timely (ideally two or three days per week) and detailed manner (ideally trade by trade). We have seen some unusual instances where RWA reporting was performed daily under Basel II, but the unprecedented uncertainty imposed by the current market-risk system would undoubtedly necessitate a considerable effort on the part of banks to reach the same reporting frequency.

Finally, tighter data quality, accuracy, and aggregation level criteria for risk IT and activities, which are currently being discussed within the Senior Supervisors Group, could bring another layer of sophistication to data quality and reporting processes.

Complexity of operation

Basel II was supposed to be a learning experience. Many banks experienced major budget overruns, often by factors of two or four. Similarly regrettable were the many unwelcome shocks that banks discovered when their methods did not perform as intended. Indeed, the two were related, as cost overruns were often caused by rewrites of initial requirements. Seeking the correct estimation approach, for example, often took many iterations and usually resulted in large cost changes, not to mention the opportunity cost as these enormous capital requirements diverted top performers in risk and finance away from other value-adding activities.

We assume that the probability of such problems will be increased under Basel III, with its tangle of interdependencies. The risk is heightened by the fact that the specifics of certain regulatory standards, most specifically the NSFR and the leverage ratio, are still being debated. The final form that these rules take could result in drastic changes to risk databases.

Eventually, banks must deal with Basel III as several other new legislation requiring joint compliance, some of which have yet to be identified, are being released.

4.2 Analysis of costs

Nevertheless, it seems that several banks have not incorporated the lessons of Basel II into their Basel III implementation planning. Most banks, we assume, have greatly underestimated the actual scale and complexity of the necessary effort. We estimate that the net implementation costs for regulatory enforcement only (not including the costs to materially develop risk and finance skills, resources, equity, and balance-sheet management, and to execute portfolio moves) for a midsize European bank would be between €45 million and €70 million (Exhibit 7).

In addition, implementation would necessitate between 135 and 210 FTE years of resources. Some banks are using the energy generated by their Basel II work to begin a more systemic transformation of their risk, financing, and information technology approaches and systems; these projects have investment budgets in the trillions of euros and timelines spanning the next two to five years. And if a bank only opts for enforcement, the initiative would contribute between 30% and 50% to the costs already accrued for Basel II.

Obviously, implementation costs may vary considerably by establishment; the expense and commitment needed depend on each bank's business model and goals to incorporate cutting-edge risk and balance-sheet management and reporting programs. For eg, we've learned from some banks that the LCR should

be simple to enforce with little effort, while others claim that implementing the LCR alone will entail a high two-digit million euro budget.

Exhibit 7

Depending on starting position, implementation is likely to cost €45 million to €70 million, mainly driven by IT.

ILLUSTRATIVE FOR MIDSIZE BANK

Work-streams	Estimated cumulative implementation cost: € million[1]	Estimated cumulative implementation cost: FTE years	Start date of reporting	Main tasks
Market risk	6–10	25–40	2012	Define/implement calculation method, introduce new processes, and set up data feeds
Leverage ratio	<1	<5	2013[2]	Implement calculation method, add data feeds, and align reporting
Liquidity/ funding	<1	<5	2013[3]	Define target funding mix, create a capital market strategy, and adapt asset mix
Counterparty credit risk	4–6	15–25	2013	Design/implement credit-value-adjustment approach and stressed expected-positive-exposures (EPE) model, adjust collateral-management process
Capital	<1	<5	2013	Define/implement calculation method, specify data requirements/add data feeds, align reporting
Compliance	<1	<5	–	Refine disclosure process, coordinate with regulator
Risk IT/ operations	35–45	90–115	–	Ensure data consistency and availability, develop applications, design new IT landscape
Business units	<5	5–10	–	Cooperate in functional workstreams
Total	45–70	**135–210**		

1 Including costs for external advice and varying share of hardware costs.
2 Observation period starts in 2011.
3 Expert estimate.

The highest cost item is risk IT and procedures, which account for about €35 million to €45 million in the enforcement situation, including data provision and integration, the introduction of new technologies and their tailoring to customer demands, the setup of hardware and facilities, and improvements to ensure IT security and a sound IT organization and governance. Might the discussions on tougher demands on risk IT result in new conditions, the outlay for enhancing risk IT and operations will rise.

4.3 getting it right—and on time

A one-size-fits-all solution to applying Basel III, we conclude, would not succeed. The disparities in governance, risk planning, management, information technology, procedures, and business information systems are too great. Efficient approaches, on the other hand, will share a variety of characteristics: a consistent aspiration and scale, for example, enforcement at a low cost versus fundamental overhaul, a thoughtful governance strategy that will yield the best design choices for the organization, for example, on how to incorporate the current market-risk system, effective project management and strong senior-management oversight, a structured development program with an appropriate project setup, a thorough work plan, and an adequate budget.

As previously stated, preparing for Basel III would entail every aspect of the bank, especially if the bank goes beyond and beyond minimum enforcement. Three working groups are likely to be needed by large banks. A strategic-planning team will regard policy as influenced by Basel III.

This work is critical because steering universal and other diversified banks is going to get even more difficult. Many contract or portfolio decisions would have to be evaluated by managers in terms of liquidity and financing positions, as well as total bank constraints. A capital and risk planning team will organize capital, liquidity, and financing management strategies. Implementation should be coordinated by a third team.

Large banks can normally form these teams independently, but with close cooperation. Midsize or smaller banks may prefer an integrated program solution, in which a single point of contact leads all three teams. In either case, clear top-level participation is needed not only to lead these teams, but also to address implementation roadblocks.

The majority of larger banks would most likely group their implementation efforts by implementation theme, such as "market-risk system" or "CVAs." Working groups will be given autonomy and will be able to operate on their own timetables under such a structure. This strategy may be perfect for implementing the current market-risk system (applicable to all banks with a trading book), the financial leverage, counterparty credit risk (CCR), and financing.

Some smaller banks may choose to arrange the initiative by purpose, such as procedures, processes, records, and reporting. This would improve the organization's existing and future upcoming efforts, as well as ease the implementation process's start.

The Basel II research illustrates that the devil is in the details. A meticulous and highly comprehensive work plan is essential for providing transparency on the interrelationship of various initiatives and coordinating activities across the bank. Early pilots, who can provide insights for later deployment, should be included in the program. It should also include the audit role as a central program manager, and it should allow for periodic check-ins with the regulator to align on proposed steps early on and to explain methodological questions and interpretations. Any wiggle room should be allowed, as small changes to the legislation are likely when the Basel system is translated into binding national laws.

CHAPTER 5 CREDIT SCORING APPROACHES

5.1 Introduction

Credit scoring approaches have become increasingly popular in recent years, owing to increased data availability, increased computing capacity, regulatory criteria, and a need for productivity and economic development (Demirguc-Kunt, Klapper, and Singer 2017).

Moreover, the application of credit scoring has shifted from traditional decision-making of accepting or rejecting a credit application to the incorporation of other aspects of the credit process like the pricing of financial services to represent the risk profile of the consumer, the setting of credit limits and regulatory capital, customer relationship management, and, in some countries, credit risk management.

In some contexts, the application of advanced credit rating approaches has shifted from conventional mathematical tools including linear discriminant analysis and logistic regression to groundbreaking methods like artificial intelligence, including machine-learning techniques like random forests, gradient boosting, and deep neural networks.

Adoption of new approaches has raised not just the complexity but also the obscurity of credit rating methods in several instances.

Unlike standard credit score models, groundbreaking approaches are often regarded as difficult to understand and describe (FSB 2017). Furthermore, novel approaches are vulnerable to overfitting (when the study applies too closely to a certain collection of training results, resulting in a failure to correctly forecast potential observations) and pose questions about justice and prejudice against minorities (European Commission 2018b).

The use of alternative modeling approaches has also expanded the types of data that can be considered important for credit score models and decisions. Credit service providers (CSPs), for example, are now using nontraditional data sources to rate customers and companies with minimal credit bureau records. However, the use of alternate data in decision systems, such as granular transactional data, has piqued the attention of data privacy advocates.

Similarly, policymakers are keenly interested in the implementation of credit scoring due to the possible consequences for national financial markets and the wider objective of financial inclusion.

Concerns have been raised about the effectiveness of credit scoring and technology. This is particularly true in markets where there is little or no regulatory regulation or industry codes to govern CSP behavior.

Credit Scoring's Development

CSPs used credit reports to provide financial services to customers, companies, and multinational firms in the early days of credit reporting. Credit reports included details about a consumer's or a business's demographics, insurance, and other services (Aire 2017).

The mathematical methodology of discriminant analysis, developed by Ronald A. Fisher, laid the theoretical foundation for modern credit scoring (Fisher 1936). When the common traits of the participants of the community are unobservable, discriminant analysis is a mathematical method used to distinguish between classes in a population using measurable attributes. Durand realized in 1941 that the same method could be used to differentiate between good and poor loans.

Linear programming was used to build one of the first credit scoring algorithms (myFICO 2018). Initially, both the factors chosen and the scores given were primarily subjective. The standardized use of the scoring form, on the other hand, led to continuity in the credit application process. This methodology marked the beginning of the use of mathematical approaches to assess creditworthiness in a systematic and straightforward manner.

Small credit reporting agencies, known as credit reporting service providers (CRSPs) in this guideline, grew into larger organizations that maintained more reliable data. The Fair Credit Reporting Act (FCRA) was enacted in the United States in 1970, requiring CRSPs to release their reports to the public, ensure that biased data such as race, gender, and disability are not used for credit decisions, and erase derogatory records within a defined time (Federal Register 2011). Overall, information technologies, business powers, and the FCRA gave CRSPs the impetus to grow from regional cooperatives to large-scale CRSPs (Furletti 2002).

Credit reporting service providers (CRSPs) may operate as either credit bureaus or credit registers. Credit bureaus are usually privately held businesses that gather information from financial and nonfinancial bodies, including microfinance institutions, and provide it to credit service providers (CSPs).

Credit registries are typically public bodies overseen by regulators or central banks (World Bank 2016a).

Finally, the economics of handling a large number of loan applications, along with improvements in the predictive power of the models and constant advancements in usable computing power, contributed to the global adoption of statistically oriented, automatic scoring systems.

Credit scoring approaches that use advanced algorithms are intended to accelerate lending decisions by more accurately measuring risk—CSPs have long relied on credit scores to determine risk when making lending decisions for customers and companies.

Historically, data on previous payment records acted as the basis of most credit score models in order to capture the borrower's desire and capacity to repay (Federal Register 2011). These systems have historically been constructed using techniques such as regression, decision trees, and other statistical analysis to produce a credit score from finite volumes of structured data. However, in some cases, CSPs and CRSPs are increasingly turning to additional, unstructured, and semi structured data sources, such as open banking transactions (see, for example, PSD 2, the revised Transaction Services Regulation [European Commission 2015]) and information collected from mobile phone use and other digital sources, in an attempt to catch a richer and more granular view of customers (Sidiqqi 2005).

A prospective applicant must have adequate past credit history to be considered score able in markets that use credit rating models based on conventional data sets. A credit score cannot be produced in the lack of this material, and a potentially creditworthy lender is often unable to obtain loans under appropriate terms.

A much more accurate evaluation of customer and company creditworthiness is possible by integrating groundbreaking analytics and new evidence. In short, the climate is evolving, and new data outlets are emerging. Nevertheless, problems persist because models and critical variables built using techniques such as machine learning on new data sources can be difficult to understand and may necessitate further research.

In addition to allowing for a potentially more accurate, segmented evaluation of creditworthiness, the use of advanced algorithms in credit scoring can help facilitate greater credit access. In summary, by using new data sources and creative algorithms to test creditworthiness, CSPs could be able to make credit assessments that were previously impossible.

Definitions of Credit Scoring

Credit scoring is a mathematical tool for predicting the likelihood of a loan claimant, existing borrower, or counterparty defaulting or being delinquent. It calculates the likelihood of default or delinquency and is commonly used in consumer loans, credit cards, and mortgage lending (Kenton 2019).

Credit scores indicate a person's creditworthiness. They are usually a numerical term that shows a consumer's or business's likelihood of making mortgage repayments on time and in full, plus any extra costs such as interest and fees. Scores may be scaled to any numerical range; typically, the higher the borrower's credit score, the lesser the chance of credit nonpayment. Credit scoring can be used by CSPs in risk-driven pricing, in which the conditions of a loan, and the interest rate given to borrowers, are based on the borrower's credit risk.

The primary benefit of a credit score is that it allows CSPs to determine an applicant's eligibility for a loan or conditional payment arrangement in a timely, reliable, and accurate manner (box 1.1). It also has an effect on the CSP's relative commodity pricing and profitability.

Credit Scores

A credit rating is used to measure the creditworthiness of companies, multinational entities, and sovereign governments. Credit ratings can be assigned to corporations, sovereigns, subsovereigns, and the securities issued by these bodies, as well as asset-backed securities.

A counterparty's positive credit record shows a high likelihood of complete recovery of loan commitments. A low credit rating indicates that the counterparty has previously struggled to repay loan commitments and will face similar difficulties in the future (Kagan 2019).

Credit ratings are normally assigned to businesses (usually bigger corporations) and states, while credit scores are assigned to individuals and micro, small, and medium-sized businesses (MSMEs). Credit scores are assigned by credit rating firms or by CSPs themselves. Standard & Poor's, for example, has a credit rating scale that ranges from AAA (excellent) to C and D (a rating less than BBB- is considered speculative, indicating that the counterparty is more likely to default on financial obligations).

Credit ratings are essential because they decide a counterparty's access to credit, form the terms of credit facilities such as interest rates paid by CSPs, and affect future investor decisions. Business credit scoring is commonly used for business lending and trade credit appraisal. Exhibit 8 summarizes the key distinctions between credit ratings and credit scores.

Exhibit 8:

	Credit Scoring	Credit Rating
Subject	Individuals, MSMEs, medium enterprises, corporations	SMEs, medium enterprises, corporations, sovereigns, securities, asset-backed securities
Data used	Demographics, past credit behavior, company and financial statement information, alternative data	Financial statements, industry, business risks, management information
Methodology	Statistical	Expert judgment or hybrid
Producers	CRSPs and CSPs, including credit managers	Credit rating agencies and CSPs using the internal rating-based approach, if approved by the regulator
Users	Credit providers; credit managers; relevant public authorities, including Central Banks and so on	Investors; companies wishing to assess counterparties for trade credit; relevant public authorities, including Central Banks and so on
Depth and breadth	Low-value, high-volume retail lending	High-value, low-volume wholesale lending
Scale	Any numerical range	AAA to D or 1 to 30

Use Cases for Credit Scoring

Credit scores and ratings are employed at every stage of the credit life span. Here are several examples:

- Application ratings based on a debtor's application information determine the CSP's decision to approve or deny the loan request, as well as price.

- Behavioral ratings based on previously existing information regarding a debtor's prior conduct in various elements of the credit life span

- Collection scores represent the possibility of the loan or customer falling deeper into delinquent based on a variety of parameters, including the borrower's historical performance.

- Early warning scores that notify the CSP of an occurrence (internal or external) that may alter the debtor's credit risk.

- Fraud detection ratings, which are based on the verification of data and activity and assist the CSP in detecting possibly fraudulent activity.

5.2 Basel Regulatory Innovations

Regulatory reforms, such as the Basel II Accord and IFRS 9 (International Financial Reporting Standards), as well as model risk management, have increased the emphasis on credit risk modeling procedures inside CSPs.

Requirements for Regulatory Capital

Requirements for Regulatory Capital The Basel Committee on Banking Supervision issued the Basel I Capital Agreement in 1988.

The primary goals of Basel I were to enhance the soundness and stability of the financial system and to adopt a consistent strategy across institutions in various nations. Although it was meant to apply exclusively to globally active banks in the G-10 (Group of Ten) nations at first, it was eventually accepted by more than 120 nations and regarded as a worldwide standard. Nevertheless, the inadequacies of Basel I became more apparent with time.

The risk percentages were insufficiently granular to represent the cross-sectional risk distribution, for example. Regulatory capital ratios were becoming less relevant as gauges of capital sufficiency, especially for big, complex financial organizations. Furthermore, the simplicity of Basel I facilitated the quick creation of a variety of solutions that decrease regulatory capital.

The goal of Basel II was to provide a regulatory capital structure that is responsive to the degree of risk that banks take on .The Basel II Accord has considerably aided CSPs in the creation of their own credit scoring systems . CSPs obliged to comply with the Basel II Accord's internal rating-based methodologies

must develop their own estimates of default probability, loss given default, and exposure at default for the Advanced method, for on- and off-balance-sheet exposures, and show their proficiency to regulators. Furthermore, CSPs that were not obligated to comply with the Basel II Accord investigated using in-house credit scoring methodologies to increase uniformity and efficiency, cut costs, and minimize losses. Credit scoring provides a rapid and proven approach to use data to decrease losses while improving profits by investing in data warehouses and analytical power.

Three pillars support Basel II

Pillar 1 establishes the principles for determining the required minimum capital for credit, operational, and market risks. The lowest capital requirements are made up of three major components: a description of regulatory capital, risk weighted assets, and the lowest capital-to-risk-weighted-assets ratio.

Pillar 2 offers advice on the regulatory review process, allowing regulators to take early action to prohibit capital from falling below the minimum criteria for maintaining a bank's risk characteristics and requiring supervisors to take prompt corrective action if capital is not preserved or recovered.

Pillar 3 acknowledges that monetary policy has the ability to enhance minimum capital criteria (Pillar 1) and the supervisory review process (Pillar 2), therefore promoting bank and financial system safety and soundness.

5.3 International Financial Reporting Standards 9

In July 2014, the International Accounting Standards Board (IASB) released the final version of IFRS 9, Financial Instruments (IASB 2014). The standard, known as IFRS 9, supersedes IAS (International Accounting Standards) 39, Financial Instruments: Recognition and Measurement, for financial entities, allocating provisions in line with the expected credit loss method rather than the incurred loss approach.

For projected credit loss computations, the new accounting standard use forward-looking default estimations.

It is intended to provide a principle-based framework for financial asset categorization and measurement; a single, forward-looking depreciation model; and a stronger relationship between accounting and risk management for hedge accounting.

A forward-looking methodology is needed under IFRS 9 for calculating the probability of default (PD), loss given default (LGD), and exposure at default (EAD). These three factors are used to calculate the 12-month and lifetime anticipated credit loss, with a macroeconomic overlay providing the predicted

forward-looking element. The IFRS 9 anticipated credit loss computation relies heavily on a point-in-time default estimate.

Credits and credit ratings may also be utilized as part of a study of the stress tests and the economic capital calculations in addition to the underwriting, regulatory capital calculations and depreciation.

5.4 Risk Model Management

The regulatory review of risk model management has intensified worldwide.

The criteria demand the application inside regulated CSPs of an effective model governance architecture.

SR 11-7, the Federal Reserve System Board of Governors and the Currency Comptroller Office (CCO) (Federal Reserve System 2011) issued The Model Risk Management Supervise Guidelines in April 2011.

The "model" is defined as a "quantitative method, system or strategy that uses the theories, techniques and assumptions of statistical, economic, financial or mathematical data processing in quantitative estimations." The Guide argues that increased dependency on models in financial decision-making processes "invariably involves model-risk, which might have detrimental effects from judgments that are based on inaccurate or misused model output and reports."

The advice expanded the scope of model risk management beyond model validation to encompass the whole model life cycle, from creation to implementation to continuous use.

The guideline emphasized the need of robust governance mechanisms in the overall success of model risk management, which include board and senior management supervision, rules and procedures, controls and compliance, and a suitable incentive and organizational structure.

Furthermore, SR 11-7 emphasized the need of considering "risk both from individual models and in aggregate." The interaction and interdependence between models have an impact on aggregate model risk. It is especially essential for credit scoring models since they are used extensively in many areas of the credit life cycle as well as in numerous regulatory capital calculations and reporting situations.

SR 11-7 anticipates that institutions will connect the sophistication of the governance process with the sophistication of the models.

Given the rapid rate of innovation, this approach highlighted the need for a greater emphasis on the control of credit scoring algorithms.

In 2017, the European Central Bank (ECB) also issued tough requirements for European Union banks, including the Targeted Review of Internal Models (TRIM) (ECB 2017). TRIM mandates that institutions have an effective model risk management framework in place that enables them to detect, analyze, and manage model risk across all models.

According to TRIM, model risk should be considered the same as any other risk category. TRIM stresses that any relevant subsets or modules, such as scorecards, should be included in the model validation process.

The three major components of IFRS 9 are as follows:

- Classification and measurement: This section introduces a novel model for the classification and measurement of financial assets, which is based on a business model evaluation and analysis of contractual cash flows, commonly known as the Solely Principle Payments and Interest [SPPI] test.

- Improvement: For financial assets not evaluated at fair value via profit and loss, it substitutes the IAS 39 incurred loss model with an expected credit loss (ECL) method (FVTPL).

- Hedge accounting: General hedge accounting standards bring risk management and hedge accounting closer together. However, because macro hedge accounting standards have not been completed, IFRS 9 permits for the continuation of IAS 39 hedge accounting.

CHAPTER 6 CONCLUSION

Basel III is more than just another series of checks and balances for post-crisis financial institutions. It is a key component of a sweeping surge of reform that would profoundly change the banking industry's ability to generate profits. As a result, amid the apparently innocuous lengthy phase-in cycles, banks should act decisively now to comply with regulations, recover their profit-generation capability, and potentially reconsider their future market practices.

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