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ISSUE 1 — APRIL 2018

ALCO

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EDITORIAL

Practitioners in banking and finance, when receiving news of the launch of yet another publication in their field, might be forgiven for simply rolling their eyes in indifference; there are, after all, so many books and journals out there already purporting to bring cutting-edge articles of value to their readers – do we really need one more? The answer, surely, is a function of what value said publication brings to the market, and here, we do hope that our brand new industry magazine ALCO will establish itself in a class of its own.

It's my privilege and pleasure to be appointed the Editor of this exciting new venture in the realm of finance literature, the product of an equally exciting partnership between Oracle and Cert. BTRM: a quarterly publication entitled ALCO. Why ALCO? (And yes, readers' surmise is correct, we are naming our new journal after the bank's Asset and Liability Committee!). Quite simply, because the ALCO is, in this regulation-heavy and capital-constrained post-crash era of ours, the paramount and the most important risk management committee in any bank. This is a theme we will be returning to on a regular basis, so I will hold off on presenting now the rationale behind the possibly somewhat bold preceding statement.

One might think that concerning oneself with only the issues contained within an ALCO's remit would be to restrict the topics of conversation, but rather the contrary: a bank's ALCO is, or should be, as its name suggests concerned with all balance sheet assets and liabilities, their cash flows and their impacts. In other words, the concern is total with respect to the balance sheet: anything and everything that impacts the balance sheet is within purview. And that's our mission at ALCO: to bring readers the very latest in developments in bank balance sheet risk management best-practice, and asset-liability management (ALM).

Our inaugural issue sets the tone with a suitably diverse set of articles, the common thread through which is that they all present and discuss issues that every bank C-suite executive, not to mention his or her team members, will want to be au fait with: be it Basel III, the impact of liquidity compliance or setting limits for asset encumbrance. We kick off with BTRM's own resident Treasury Notes commentator, David Castle of Waltham Partners, who discusses the Big Data side of Treasury ALM interest. We also have BTRM Head of Faculty Chris Westcott summarizing the very last piece of the Basel III puzzle, the final chapter published by the BIS Committee only last December. This is followed by some incisive, succinct and accessible discussions from Peter Eisenhardt on bond market liquidity, Ed Bace on Credit Risk and the ALM discipline and Enrique Benito on asset encumbrance.

In addition to the more newsworthy items that we hope to bring to you every quarter, every issue will contain at least one more in-depth technical article, delving deep into the intricacies of ALM. For Issue 1, we're pleased to present insight into optimum "steering" of the Basel liquidity ratios, the oft-referenced Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR), by a bank wishing to implement best practice. For this we are grateful to Christian Buschmann at Commerzbank in Frankfurt and Christian Schmaltz at Aarhus University.

We hope you enjoy this issue of ALCO. I would like to thank everyone at Oracle Financial Services and BTRM for their involvement and help with this inaugural issue, the contributing authors and, of course, you the reader. I hope everyone has as much fun reading this as I had working on it. All the best...

Professor Moorad Choudhry

University of Kent Business School



March 23, 2018



ALCO

Issue 1 – April 2018

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Submission Guidelines

ALCO welcomes article submissions from industry and academia. Please submit your manuscript by email to: enquiries@btrm.org.

Questions about the magazine and the status of articles are welcome by email.

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In every issue of ALCO, we will be presenting one in-depth technical article, the aim of which is to generate debate as well as to inform. For Issue 1, we consider the issue of compliance with Basel III liquidity standards (those bywords for assumptions-based risk estimation, LCR, and NSFR), and their impact on the balance sheet. For many banks this is materially significant, as entire business lines may have to be re-designed or even divested as they become more expensive to run or, indeed, unviable. For insight into steering one’s way around the LCR and NSFR maze, Christian Buschmann’s and Christian Schmaltz’s article on the challenges posed by Basel III liquidity compliance is top notch.	
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01



JFDI – JUDGMENTS FROM DATA INSIGHTS

The Journey from Compliance to Ecosystem in Banking and Treasury

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Judgment, (noun), the ability to form an opinion, estimate, notion, or conclusion as from circumstances presented to the mind, especially in matters affecting action.

The pace at which the advances in digital application are impacting banking has been faster than many commentators expected. Over the last two years, the rise in the number of disruptors and the prominence of platform companies has increased the threat to banks' dominance of several product lines, in particular perceived customer ownership.

In February 2017, we highlighted the urgency with which banks should adopt collaboration with FinTech companies which provide new techniques for data analytics, customer service, and adapting work flow, suggesting that this approach would rapidly become BAU. This would enable early adopters to move to new business models which protect and maintain their relevancy.

During October 2017, both McKinsey & Co. and The Financial Brand published digital banking reports supporting this thesis and also highlighting that the pace of change is ahead of where most expected. The Financial Brand highlights that, not only has the digital agenda become more intertwined with innovation and business strategy, but that the transformation of back-office processes through to customer-facing experiences should now be in lock-step.

In their Digital Banking Report, Financial Brand goes on to say that "being a leader in innovation and emerging technology is no longer a luxury only for big players, it is important that all financial organizations make this a core competency."

McKinsey, in their paper *Remaking the Bank for an Ecosystem World*, report that, while pressures from regulatory change and disruptive threats to retail banking may be easing, there are new threats in capital markets and investment banking and they expect the very customer-centric platform companies will be watching this closely.

We believe that banks are well positioned to make the leap to new business models, but to do so they need to increase the pace of adopting experimentation and collaboration, move quickly to maximizing benefits of the internal data community and adapt more swiftly to embrace new techniques for digitally industrializing core processes.

Evolving the culture within a financial services company to achieve all this is not easy, but we believe that banks, and buy-side firms, have the component parts to make it happen.

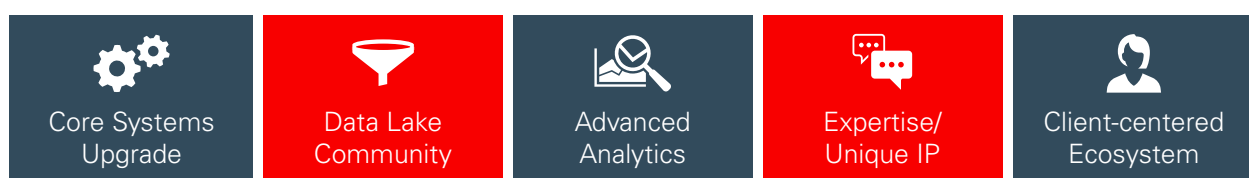


Exhibit 1: Journey from closed banking to open client-led ecosystem

What's at Stake?

A bank's core "IP" is the transmission and conversion of capital across a suite of products which meet the needs of depositors and borrowers, plus the unique expertise of a particular firm in a product, geography or marketplace. Relatively high regulatory barriers to entry mean that much of this "IP" is protected, but with the rise of customer-centric platforms and marketplaces focused on distribution or disintermediation all but the very "basics of banking" are at risk.

In his excellent 2016 paper *A Trillion Dollar Market, By the People, For the People*, Charles Moldow of Foundation Capital highlights that marketplace platforms could not just disrupt but displace banks from all but the highest value segment of the lending market where deep due diligence and complex structures are the norm.

The growth of peer-to-peer marketplaces where participation in a loan or pool is possible, and also secondary liquidity is emerging, offers a real alternative to a bank balance sheet – especially as cost/yield favors customers and account opening processes are almost always more straightforward based on excellence in user experience and application of data.

This would suggest that, in some parts of the core banking product suite, long-term disruption has already been seeded and will evolve over the next 5-10 years.

PSD2 will accelerate the development of open-banking business models and to some extent play into the hands of the platform companies who are continually deepening their share of mind with consumers and enterprise from a hardware, payments, logistics and software perspective. However, GDPR balances PSD2's open data push ensuring that the customer is in control of by who and how their data is used.

Banks do maintain a position of trust, with both consumers and corporations, to be the custodians of their data, and their money. In combination with the core “IP” of banking this presents an opportunity to transform business models and emerge stronger.

Some visionaries highlight a future world where an enterprise’s balance sheet is optimized by machine,

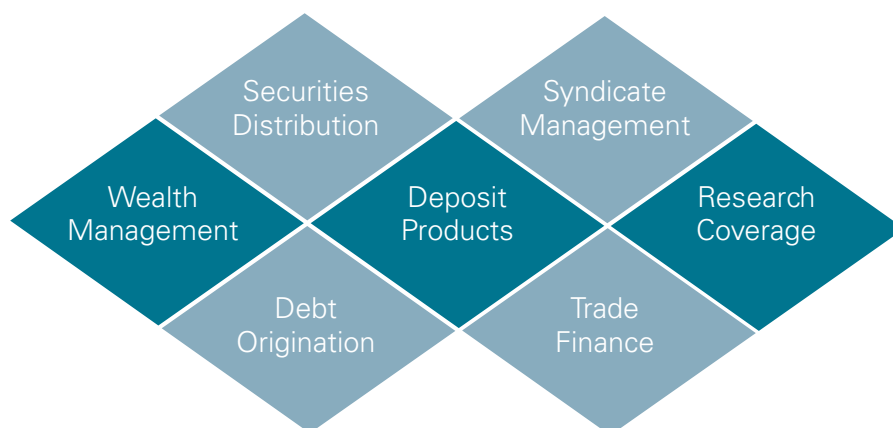


Exhibit 2: Products where Treasury and Markets businesses excel but are open to disruption/automation

funding needs identified by predictive analytics, origination process triggered and managed by a TMS, syndication process conducted by robots, securities distributed over app-store like portals, and immutable records of ownership of these digital securities recorded on the blockchain.

If you have recently explored ICOs, attended an AI (artificial intelligence) conference or had the pleasure of a VR (virtual reality) emersion in a future world then you could convince yourself that this will, in fact, be the way of things.

How we get from here to there and how a financial services company makes collaboration, experimentation, and transformation a core competency will be the driver of who gets to play the new game. New rules apply to everything that we do and the pace of change will only pick up during the next decade – *starting immediately*.

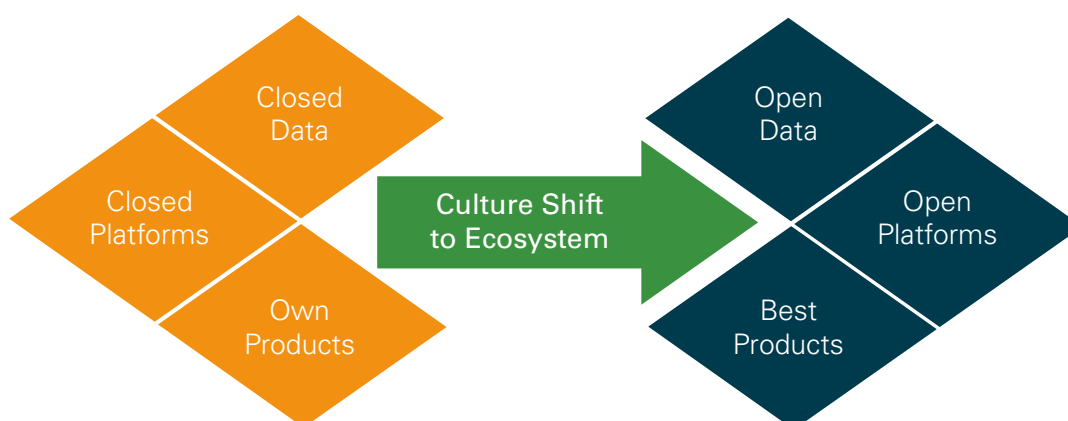


Exhibit 3: A cultural shift in banking and markets may be the hardest step

The Critical Need to Access, Analyze, Visualize, and Protect data

For the banking and financial services executive, the vast amount of data built up over decades (and growing rapidly) holds the key to being able to make informed and tested judgments about how to tackle the shift taking place across the industry.

The challenges, though, are numerous; data will currently be dispersed across legacy systems, entities and business lines built up during the product led, silo driven, period of rapid growth by acquisition and leverage. In the years since the financial crisis of 2008, a significant part of the focus on data has been to comply with regulatory demands which have often come at a pace to which complex organizations were not set up to respond.

Huge resources have been spent on regulatory implementation, sourcing, reconciling, compiling, and reporting data to internal and external parties. While many efficiency gains may have been realized – through identifying data quality improvements, streamlining data reporting structures, and reducing the human resource required to perform such tasks – the industry is now at a point where really delivering value from this process is an absolute must.

Treasury, Risk, and Finance are at the core of the bank ensuring that the core “IP” is executed upon in a compliant, efficient, and cost-effective manner. Treasury getting this right enables the unique IP of a firm in a product or location to be sustained and their experts to maximize returns in a new ecosystem business model.

But in an increasingly connected and data-led economy, how does Treasury, together with Risk and Finance teams, make best use of data to test and simulate important decisions so that the expert judgment of Treasury or executives is increasingly well informed?

Enter AI, Machine learning, and scale simulation to improve the pace of data digestion and produce early warnings of strategic threats or un-common behaviors across business lines, products or clients.

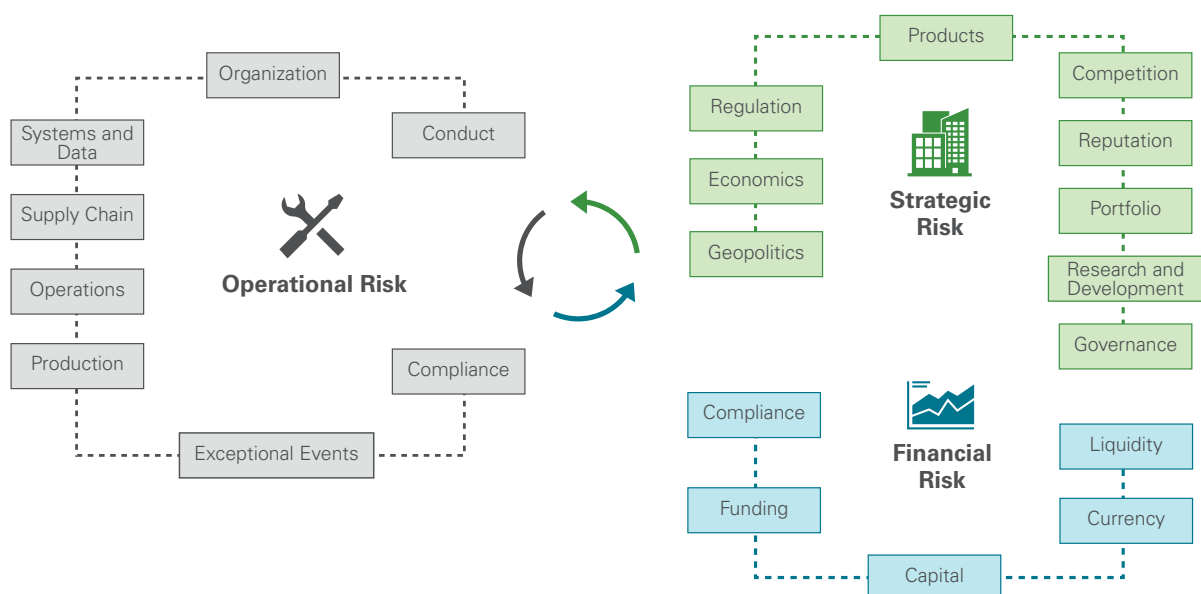


Exhibit 4: Modeling enterprise-wide data provides significant insight opportunity

Stress testing is a highly complex and expanding subject for banks and other financial services companies. New divisions have been created fusing multi-discipline expertise to ensure compliance with the raising regulatory bar and to begin to connect models across the organization to meet newer demands such as IFRS 9 or FRTB (Fundamental Review of Trading Book). Taking a data community approach to this expertise, and applying the right base layer of computational development software means that platforms may be applied and models customized to substantially change the way Treasury works and generate deep insights upon which expert judgment may be based.

Agent-based modeling has been gaining an increasing level of attention from regulators, industry participants, and data scientists over the last several years, accelerating in 2017 with publication of expert papers and thought leadership pieces from the Bank of England and EBA.

WTF – What’s the Fuss?

For the Treasury Layman Agent Based Modeling enables us to model our world and run simulations of how specific agents (see below) may react and respond to events, decisions, and the actions of each other.

This is a complex arena and one which (for the writer at least) heightens the need for your Treasury to be data-science ready. An agent can be constructed in many ways, depending on what you want to simulate or model. Debate, often rife, about being able to accurately model agent behavior can be addressed by beginning with a model layer that enables a bank to construct their own “world” by combining a library of agents and drivers (i.e. regulatory maps) with their internally generated behavioral analytics enhanced by machine learning.

AGENT TYPES	CHARACTERISTICS OF AGENTS
Bank	Agents can represent any layer of abstraction. Typically this includes data support forms of the agent and its behavior. For example, individual client interactions represented in segment or the impact or change in a balance sheet from a markets behaviors specific to an asset class or event.
Entity	
Business	
Market	
Segment	
Client	
Peer	
Industry	

Exhibit 5: Agents modeled on specific behavioral data provide new insights on related and reactive impacts

Characteristics of Agents

Agents can represent any layer of abstraction. Typically this includes data support forms of the agent and its behavior. For example, individual client interactions represented in segment or the impact or change in a balance sheet from a markets behaviors specific to an asset class or event.

Agents modeled on specific behavioral data provide new insights on related and reactive impacts.

By taking this, or a similar, approach to modeling your world in the context of the outside world, Treasury can begin to ask questions of the balance sheet that are not only important for risk management but can be applied to business model transformation. Prof. Moorad Choudhry explains: “adopting these techniques enables Treasury to really know its own balance sheet. The drivers of key metrics such as net interest margin (NIM) can be understood with better precision, and similarly as in the area of stress testing the bank can derive precise firm-specific scenarios and factor changes when planning and forecasting NIM. Understanding better how changes in internal and external factors impact the balance sheet from a risk and P&L perspective also facilitates more integrated assets and liabilities origination. This is a key ingredient of genuine strategic ALM capability.”

Put simply, moving from the compliance decade to the open data economy can put Treasury insights center stage when the executive team explores strategic judgment calls. You might be simulating funding risk based on a specific market event, or you could gain insight to Net Interest Margin from a shift to an open marketplace business model.

SCENARIO	INQUIRY
New Product Launch	How will clients react to new vs. existing products?
Resource Allocation	NIM outcome of capital or other resource changes
Liquidity Risk	How will specific clients react to a scenario?
Business Exit	Capital position changes and client impacts
Ratings Changes	Shift in funding position and management actions
Reverse Stress Test	Balance sheet impact of narrow or broad event

Exhibit 6: Simulation enables agents’ behaviors to be modeled against many scenarios

Gary Frost, CEO and founder of 51zero – a market leader in big data and modeling transformation in financial risks – explains the three big things that an organization (especially a Treasury) needs to do to achieve these strategic insights:

Data Governance is Key

Hundreds of data sources flow into Treasury’s data warehouses. Without appropriate data governance structures modelers may find themselves in a quagmire of data quality issues. A data governance program will allow you to organize and categorize your data, avoiding duplications or gaps, simplifying the on-boarding of new data sources and enabling the move from data to information.

“Big Data” Computational Power

Whilst not all the data volumes are huge “big data” has moved from computation based on very large unstructured data, to highly complex calculations on smaller sets of structured and unstructured data, run at massive scale. Leveraging Hadoop-based data warehouses to perform distributed computation will allow you to run sophisticated scenario analysis. Platforms and tooling sitting on top of the big data stack allow for the execution of complex agent based simulations which generate deep insight.

Agility

It is no longer acceptable to plan software release cycles every quarter. The pace of regulatory change as well as business demands for insights from their data means that IT departments must become much better at releasing software more frequently. There are tools and techniques to improve the delivery cycle (e.g. DevOps), but IT departments cannot achieve agility in isolation. Organizational and communication structures between the business and technology groups need to change to support a Continuous Delivery cycle.

As we consider this from a Treasury perspective, how do we ensure that our balance sheet managers are involved in the strategic conversation about adopting these types of technology across the bank?

Our view is that, as our industry changes and we modify our technology, every part of our bank will be joined by a data community. This means that innovation, data architecture, process digitization and, by dint, how we model our world will super-charge culture change in the industry from “protective” to “expansive” behavior. The choice between the two cultures is, really, a choice between being an infrastructure or customer-focused company.

It’s still early in the journey, but, as we have tried to show, not only is the pace increasing exponentially but these developments will impact every part of our industry – now.

The time has come to shift to an ecosystem model based on highly informed Judgment from Data Insights.

J.F.D.I.!



David Castle is a 25-year City and Wall Street veteran with a sterling background in capital markets and treasury at Standard Chartered and Citibank. He is Managing Partner of Waltham Partners Ltd., a financial services consultancy.








02

ORACLE FINANCIAL SERVICES & BTRM – NEW STRATEGIC PARTNERSHIP

Oracle FSGBU is delighted to announce a new wide-ranging, industry strategic partnership with the market-leading BTRM, which awards The Certificate of Bank Treasury and Risk Management.

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	Publish a quarterly industry risk magazine, “ALCO,” offering alternative views on a range of risk, regulatory, and finance issues and financial markets developments
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	Play an influential and active role in different industry bodies and market associations
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	Create highly customized training courses tailored to meet the needs of a bank’s risk and finance professionals



“After extensive research and detailed assessment of potential industry alliances, it is an absolute privilege to be joining forces with the prestigious and highly respected BTRM. This critical partnership will exploit the common synergies of both global organizations solely for the advancement of the industry during these challenging times.”

Ziauddin Ishaq, Global Solutions Lead Treasury, Oracle FSGBU



“It’s fantastic to be partnering with Oracle, a world-class, global organization that is so closely involved in the banking industry. This is an exciting partnership with the goal of building and influencing the bank risk management community, spurred on by its professional qualification – The BTRM.”

Professor Moorad Choudhry, Course Founder and Designer, BTRM

ORACLE® Financial Services

About Oracle Financial Services

Oracle is a market-leading risk technology vendor with award-winning risk, finance, regulatory reporting, and data management solutions used by global Tier 1 banks. Oracle’s footprint spans more than 100 countries and has more than 1,500 customers. At least two-thirds of all global systemically important financial institutions (SIFIs) use Oracle Financial Services Analytical Applications (OFSA). Oracle was the Chartis Risk Tech 2018 Award winner for Balance Sheet Risk Management, Data Risk Aggregation and Reporting, and Core Technology, and placed second in the overall 100 Ranking for the second year in a row.



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03

BASEL III FINAL CHAPTER REFORMS

BY CHRIS WESTCOTT, HEAD OF FACULTY, BTRM

THE ARTICLE PROVIDES A CONCISE BRIEFING ON THE MAIN CHANGES TO THE REGULATORY FRAMEWORK AND THEIR IMPLICATIONS FOR BANK CAPITAL ADEQUACY.

The “final form” of Basel III, issued by the Basel Committee in December 2017, has been designed to complement the changes to the global regulatory framework introduced by Basel III (December 2010). It also completes the process of introducing the Basel III requirements (unless, of course, subsequent reforms are made to them) that began with the publication of the original paper on Basel reforms from the Basel Committee on Banking Supervision (BCBS) in 2010.

The final chapter of the Basel III reforms aims to establish greater risk sensitivity in the calculation of Risk Weighted Assets (RWAs) and enhance the comparability of banks’ capital ratios, through closer alignment of the standardized and advanced methodologies, and through the establishment of an “output floor” for RWAs.

Significant revisions are being made to the existing standardized approaches to enhance granularity and risk sensitivity and reduce the mechanistic reliance on external credit ratings. The amendments affect bank, corporate, residential, and commercial real estate, retail, subordinated debt, equity, un-rated, and off-balance sheet exposures. By way of illustration, owner-occupied residential real estate exposures, which attract a 35% risk weight under the Basel II rules, will, in the future, be assessed according to the loan to value ratio (LTV), with risk weights ranging from 20% (for LTV<50%) to 70% (for LTV>100%).

The use of Advanced Internal Ratings Based (AIRB) models is being removed for certain asset classes, such as exposures to large and mid-sized corporates, banks, and other financial institutions and equities. In the view of the Basel Committee, models in these areas are excessively complex and their outputs, are neither robust or comparable. Also, AIRB models are to be further constrained by the re-calibration of existing floors on bank-estimated AIRB parameters (e.g., probability of default, loss given default, and exposure at default values), and the introduction of new floors.

The initial Basel III framework introduced a capital charge for potential mark to market losses on derivative instruments as a result of a deterioration in the creditworthiness of a counterparty. This Credit Valuation Adjustment (CVA) risk was a major source of losses for banks during the financial crisis, which often exceeded those arising from outright defaults. In the latest changes, risk sensitivity is being enhanced with a greater focus on the underlying price of transactions in calculating the Credit Valuation Adjustment (CVA) Risk Capital Charge. Also, the internally modeled approach is being removed, as it is perceived to be too complex for banks to model it effectively, and the CVA framework is being aligned with the approaches used in the revised market risk framework.

The Basel Committee has acknowledged that the risk capital held by firms to cover operational risk losses has been insufficient, and internal models have been ineffective in assessing capital requirements for risks, such as misconduct and inadequate systems/controls. In order to address these shortcomings, the existing Advanced Measurement Approach and the three standardized methods are to be replaced with a single standardized approach.

Changes are also being introduced for the Leverage Ratio framework to ensure the ratio acts as a constraint on leverage, particularly for larger institutions. Those systemically important banks (SIBs) required to maintain a G-SIB buffer as part of their capital adequacy ratio will be subject to higher leverage ratios and additional constraints on distributions.

To maintain a level playing field between banks using internal models and those on the standardized approaches, a new output floor is being introduced (replacing the existing Basel II floor, which is set at 80% of the Basel I capital requirement). Under the revised floor, a firm's capital ratios will be based on the higher of RWAs calculated using internal model approaches and

72.5% of RWAs arising from the equivalent standardized approaches. This will place a limit on the regulatory capital benefits that a bank can obtain from using internal models.

A key consequence of this change is that all financial institutions, subject to the Basel III framework, will be required to calculate RWAs using the standardized methodology.

The European Banking Authority (EBA) has published a high-level impact assessment of the reforms, based upon quantitative impact study data from 88 European banks as of December 2015. In aggregate, minimum Tier 1 capital requirements for this banking cohort are anticipated to increase by 12.9%. There is a huge disparity in the scale of the impact, depending upon the size of an institution. So-called Group 1 Banks, those with Tier 1 Capital in excess of €3bn, are facing an increased requirement of over 14%, whereas for the smaller Group 2 Banks, with Tier 1 Capital below €3bn, the increase is likely to be below 4%. Global Systemically Important Institutions (G-SIBs), will be worst hit, with Tier I capital needs rising by over 15%. This prospective outcome is perhaps not surprising given the stated desire of the Basel Committee to "enhance the comparability of banks' capital ratios."

The majority of the rule changes will be effective from January 1, 2022, though transitional arrangements will apply to the aggregate output floor, which will not be fully implemented until January 1, 2027 (16 years after the initial Basel III announcement).

We can only speculate on why the transition period is so long. It could be due to one or more of the following:

- Sufficient time for outliers to adjust their balance sheets in a controlled manner?

- Compromise within the Basel Committee to obtain agreement to the whole package of changes?
- The operational complexity faced by larger institutions in calculating RWAs using both the advanced and standardized methodologies?
- Recognition within the Basel Committee of the scale of the burden of ongoing regulatory change?

Before the rule changes are legally enforceable, they must be adopted by the authorities in each Basel Committee member country. The next implementation stage will be the publication of prospective rules from national regulators, eagerly anticipated later in 2018. Although the broad approach in each jurisdiction is likely to be the same, it is important to study these proposals as there can be small differences in implementation timetables, and the substance of the final regulations in each jurisdiction.



Chris Westcott has more than 30 years of experience in the banking industry, with the majority of time spent in the field of treasury management. He has held a range of senior positions in the Treasury functions of both Nat West and Royal Bank of Scotland in the United Kingdom.



04

IRRBB: SENDING THE WRONG SIGNALS?

From a gone concern to a going concern – why the BCBS enhanced Pillar II-approach for Interest Rate Risk Banking Book (IRRBB) could send the wrong signals

BY ZIAUDDIN ISHAQ, GLOBAL SOLUTIONS LEAD FOR TREASURY, ORACLE FSGBU, AND ELISABETH LAURE, MASTER SALES PRINCIPAL CONSULTANT EMEA, ORACLE FSGBU

More than a decade has passed since the Principles for the Management and Supervision of Interest Rate Risk were first published by the Bank for International Settlements (BIS) Committee back in 2004. In April 2016, and after much consternation from the original consultation document, the finalized Basel Committee on Banking Supervision (BCBS) Standards for Interest Rate Risk in the Banking Book (IRRBB) were released. The principal highlight, to the relief of majority of banks was the dropping of a regulatory Pillar I capital charge to cover IRRBB, to be replaced with a more enhanced Pillar II approach. This is the same approach advocated by the European Banking Authority (EBA) which will be publishing its final guidelines scheduled

come into force on the December 31, 2018.

On the face of it, this major concession on the Pillar I capital charge was a significant win for banks, as its pursuance by the BCBS was twofold, namely to ensure banks had adequate capital to cover potential losses that arose due to changes in interest rates, and secondly, (and in light of the BCBS' Fundamental Review of the Trading Book) to reduce the opportunities for regulatory capital arbitrage between the banking and trading book.

Despite this, one should not underestimate the challenges an enhanced Pillar II approach will bring, both operationally and strategically, in particular whether disclosure of the IRRBB regulatory metrics will send the correct signals to external stakeholders. Furthermore, the finalized standards do not shy away in recommending further action (including additional capital requirements) against banks where it is demonstrated there are inherent weaknesses in their qualitative and quantitative processes.

What are the key elements of an implementation strategy banks need to be cognizant of that will

result in an unambiguous, well contextualized and informed view of how it manages its IRRBB?

Highlights of BCBS Finalized Standards IRRBB

- Pillar I approach dropped
- Replaced with enhanced Pillar II principles-based approach
- Quantification IRRBB – via economic (▲EVE) and earnings (▲NII) based metrics
- Broaden stress testing programs, including incorporating six prescribed regulatory scenarios, and negative interest rates
- Assess, manage, and report Credit Spread Risk Banking Book (CSRBB)
- Behavioral and modeling assumptions are appropriately scrutinized, validated, and understood by senior management
- Onerous disclosure requirements – transparency and consistency to help aid comparability
- IRRBB models – subjected to robust, fully audited model governance process
- Failings in banks' management of IRRBB – capital consequences, forced move to the standardized approach
- Impact of regulatory interest rate shocks on economic value of equity (EVE) must not be greater than 15% of Tier 1 Capital, previously threshold set at 20% – “outlier / materiality test”

Banks' strategic concerns of the BCBS IRRBB Finalized Standards

- There are reservations that the enhanced Pillar II approach will expose too much detail of how a bank positions and hedges its balance sheet by virtue of what can be gleaned and interpreted from the range of EVE sensitivities under

each prescribed interest rate scenario. Some banks complain that disclosure of all the regulatory interest rate scenarios could reveal useful intelligence about a bank's balance sheet duration, thus disadvantaging its hedging strategy

- Exclusion of equity from EVE disclosures, create, and exacerbate a repricing mismatch as equity investments will appear to be unfunded and unhedged. There is a real risk investors and analysts could misinterpret EVE disclosures on a “going concern” basis, thus overstating the risk, particularly for longer duration portfolios, when viewed under higher interest rates. To set the right context in this highly non-normalized interest rate environment, disclosure discussions with external stakeholders will need to be carefully managed to obviate any confusion the bank is somehow over exposed to interest rate risk versus its peers. The delicacy of these discussions will be further hampered by the freedom to use a range of risk-free rates, which can either include or exclude commercial margins to discount cash flows to derive the EVE. Another headache is investors may question the bank's equity investment strategy, its duration and its risk profile.
- On the funding side, Table A quantitative disclosures section of the finalized standards require banks to provide details of the average and longest repricing maturity for non-maturity deposits (NMDs). Such details, when viewed together with the high-level assumptions underpinning those deposit pools, provide competitors insight to a bank's deposits strategy including pricing.
- With global interest rates unlikely to rise at an accelerated pace in the near future, one could argue that banks' behavioral

deposit and prepayment models are influenced less by interest rates versus other contributing factors. Viewing the standardized framework of the finalized standards, the BCBS expects an indicator of deposit stability to be evidenced through 10 years of historical data. From this historical data set, it would be intriguing to see what conclusions could be drawn when comparing the zero interest rate behavior of recent years versus pre-global financial crisis.

- The finalized standards permit and recommend local supervisors supplement the standard “outlier” test with other materiality tests, which are predicated on a set criteria (to be defined and published by the supervisor) and subsequently applied to identify an outlier bank that is running excessive IRRBB. For banks operating in multi-jurisdictions, there is a prospect overseas regulators could apply via their IRRBB programs, a local punitive outlier/materiality test, way more stringent than the 15% threshold. Failing this test would subject the overseas entity (bank) to adjust its risk profile or seek further support from head office. Without knowing the supervisory criteria to distinguish outlier banks, banks will need to tread carefully and consider a range of EVE sensitivities under different internally calibrated stress scenarios, which could see the decline in EVE greater than 7.5% and 10% of Tier 1 capital. The local supervisor could also broaden the scope of an outlier test to evaluate the sensitivity of EVE to an alternative capital measure as well as considering the implications of IRRBB from earnings volatility. Obvious as it may be, no bank wants to be labeled or published as an outlier (or ranked as close to becoming one) during normal market conditions, let

alone during a market stress, where the permutations of how the stress unravels are unknown.

New IRRBB Presents Operational Challenges for Banks

If we utilize the definition of IRRBB as per the BCBS Finalized Standards, “IRRBB refers to the current or prospective risk to a bank’s capital and to its earnings, arising from the impact of adverse movements in interest rates on its banking book,” the key theme one could argue is the emphasis primarily placed on obtaining an accurate forward view of IRR and how the impact of the risk could crystallize in such a way to the detriment of the bank.

Despite the relaxation from a Pillar I to an enhanced Pillar II approach, the challenge for banks will be obtaining the level of transparency required for providing a set of unified consolidated IRRBB metrics that clearly illuminate the underlying risk drivers and how they dynamically impact the bank’s IRRBB profile. Under the finalized standards, banks are compelled to undertake regular, more comprehensive reviews and simulations of their balance sheet strategies. Additionally it is essential a bank safeguard the alignment between its policies, model assumptions, data and computational processes, and final regulatory reporting metrics. Any disconnect between them would raise question marks on the integrity of the bank’s overarching risk management framework and potentially could lead to the regulator imposing some further measures.

Deriving a consolidated view of its IRRBB could be an onerous task, particularly for large international banks, where it is not unusual for overseas units that operate under a decentralized model to make frequent adjustments to their asset and liability management (ALM) metrics. This also means that the management of IRRBB

should be supported by a strong models governance framework, whereby models are maintained and calibrations reviewed regularly, and their methodologies documented, ready to be reported and discussed with the national supervisor.

Another key element of the final standards is the requirement to separately analyze the interest rate components for IRRBB, with no limitation to a “Risk Free Yield Curve.” Although market spread analysis has always be part of the ALM perspective, this represents a specific challenge for banks in a context of extremely low or negative interest rates, since those spreads sometimes represent the most important part of the customer rate itself.

The data challenges under this enhanced Pillar II approach are not insignificant. IRRBB assessment requires banks to load all existing contracts and positions together with customer data that will help to stratify and document the behavioral assumptions applied. To validate any interpretations of this assessment, there should be consistency and commonality between the data ingested by ALM, credit, liquidity risk, and funds transfer pricing (FTP) solutions and, therefore, reinforces the need for a global risk and finance data governance framework.

Re-evaluating the ALM Framework in Light of IRRBB Finalized Standards

As regional regulators ratify local IRRBB requirements, banks have an opportunity to re-architect their ALM infrastructures and integrate them within broader corporate management information systems, so as to gain a new level of transparency and global strategy simulation capabilities, which can significantly improve their competitive positioning.

Considerations to keep in mind when planning for a next-generation ALM framework, include:

- Revisit approaches and methodologies that measure embedded optionality. In light of the finalized IRRBB standards, it makes good business senses to take a fresh look at existing deposit behavioral and pre-payment models and make a formal appraisal of the underlying assumptions. Do the models reflect the unique dynamics of today’s market, and how would they fare under a more “normalized” rising yield curve outlook?
- Validate with ALCO that they have a complete appraisal of the risks faced by the balance sheet. Discuss whether the IRRBB metrics produced as part of the current ALCO report provide the



appropriate insights that bear out the potential ramifications for liquidity and capital. For example what does a volatile EVE bode for the paths of the liquidity coverage ratio (LCR) and net stable funding ratio (NSFR)? What other analysis should be undertaken? Is it clear, for a set of internal plausible stress scenarios, how the bank would continually fund and hedge itself?

- Evaluate the significance of the new IRRBB requirements alongside other Basel III obligations on how effectively the bank can progressively optimize its balance sheet or parts thereof. Managing the balance sheet today to deliver healthy returns has become that much more difficult, given the regulatory, market and management restraints. For example, extracting a few additional basis points from core funding pools by optimizing incremental net interest margin (NIM) will be weighed up against economic value of the investment profiles of the deposits and balance sheet limits, which require a certain liquidity profile to be adhered to, given the deposit behavior run-off under a FTP process and how this, ultimately, impacts the LCR and NSFR.
- Are the costs of embracing the standardized framework versus the enhanced Pillar II approach well understood? On the face of it, a bank logically would want to avoid going down the road of the standardized framework, but for some there may not be enough concrete historical data to support meaningful analysis of how much embedded optionality exists in the balance sheet, or there could be very little evidence to suggest otherwise. Another reason could be the absence of advanced tools and applications to undertake the quantitative investigations

required under the principles of the enhanced Pillar II approach. Whatever the rationale for not taking the principles-based approach it would be useful to approximate (if possible) what the incremental cost of hedging the balance sheet would be. A bank should broadly accept that adopting the standardized framework will reveal more sensitive details about how it positions its balance sheet due to the prescriptive constraints, which limit the use and flexibility of internal models.

- How informative is the current forecasting analysis and does it play a real tangible role in the balance sheet planning process? Consistent with driving the ALCO forward and challenging its opinions of how the balance sheet and earnings would evolve (or not), there should be clear guidance on the trajectory of earnings under a multitude of views. The succinct analysis in itself should provide the narrative of where the risks reside under each scenario, in particular the interplay of how economic conditions could sway customer behavior and the implications of if and how the bank will continue to fund and hedge the balance sheet and at what cost. In some respects, the impact of scenarios in themselves should be viewed heterogeneously to reflect that certain balance sheet actions/strategies may not be viable due to the nuances of the bank's business model or the market environment is no longer conducive to accommodate the bank's balance sheet needs due to lack of access, prohibitive costs, or a combination of all the above. Having a matrix view of the balance sheet and earnings projections under each scenario versus those key behavioral metrics and how they evolve gives ALCO a fuller context when

deciding what are the best strategies that could be executed to obviate further risks, while simultaneously preserving profitability.

- Elevate data governance. Given the numerous disparate source systems that proliferate across a bank, banks have realized that implementing a robust data governance framework is a major undertaking since it requires an overhaul of procedures, processes, and how data overall is managed. Similar to other regulatory requirements, the BCBS IRRBB Standards demand and expect data consistency across the behavior modeling cycle, as well as for ensuring the accuracy of any simulations.
- Move away from a static view and make it a business-as-usual activity to evaluate the impact of alternatives scenarios on earnings and profitability. Under current market conditions, and taking into account supervisors' priorities, the management of IRRBB is evolving from a gone concern to a going concern view. It means that the focus is put on margin simulation, using regulatory and internal scenarios. Since banks are under pressure to reduce the time to market to launch new products, the banking portfolio can evolve rapidly, and the assumption of IRR metrics measured under a constant volume and structure assumption is not sufficient anymore. Dynamic simulations have to be automated and should include not only market scenarios but business evolutions as well. If done efficiently, it should provide the bank tangible value to how retail and corporate products are priced optimally to deliver superior returns.
- Review ALM and FTP systems as two views of the same mechanism. Banks that are able to fully incorporate the costs of managing IRRBB into their FTP

operations will better align their profitability targets and risk appetites, and make it easier to test and execute strategic decisions. This way, internal income and risk allocation will be consistent with the evolution of market rates and their distribution into interest rate components, so the whole organization will dynamically contribute to improve profitability. The integration of ALM processes with FTP mechanisms will help detect non-profitable activities before they result in real losses.

Conclusion

The BCBS IRRBB and shortly to be finalized EBA Standards could be viewed as giving interest rate risk and how it is managed much greater prominence than previously, and one could argue its importance now justifies sufficient public disclosure of certain sensitive measures. Apart from the disclosure requirements, there is a real effort by the BCBS to emphasize the importance of getting much greater clarity of what drives the underlying assumptions of the bank's internal critical behavioral models and how it would seek to secure its franchise under a wide range of stress scenarios. A key theme is the implicit understanding that, at each juncture of a stress scenario, the bank has a grasp of what and how customer responses would be to a change in the economic or market environment and the likelihood of occurrence.

Despite the BCBS no longer advocating a Pillar I capital charge for IRRBB, it does not mean that banks should equate the enhanced Pillar II approach as "business as usual." Operationally, banks will need to generate granular, detailed cash-flow information at greater frequency, coupled with a re-appraisal and in some cases re-haul of internal models across different jurisdictions to assess whether they are still fit for purpose. Special attention must also be given

to developing a far more robust governance framework that ensures confidence in all operational aspects that produce IRRBB analysis that is shared with ALCO.

A bank, failing to manage IRRBB in a less than adequate manner for a host of reasons both quantitatively and qualitatively is sufficient grounds for a local supervisor to impose some uncomfortable penalties plus be given the unfortunate title of an “outlier,” which will create uncertainty and confusion and is something to be best avoided. However, with no Pillar I charge required, banks are expected and should take advantage of this regulatory easing to make a far deeper assessment of how IRR is viewed and discussed internally, such that any market opportunities are much more easily identified and can be realistically maximized to deliver continued returns or offset potential risks.

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05



THE GREAT BOND MARKET LIQUIDITY DEBATE: Where Do We Stand Now?

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OPINIONS EXPRESSED ARE SOLELY THOSE OF THE AUTHOR AND DO NOT EXPRESS THE VIEWS OR OPINIONS OF ICSA- MEMBER ASSOCIATIONS.

Ever since the outbreak and turmoil of the Global Financial Crisis – and subsequent massive government support – it became clear that Asset Liability Management (ALM) could never be the same again. Banks would need to build much stronger liquidity positions designed to weather the most severe of storms. Radical new regulatory reforms including the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) meant that only the most stable of short-term funding sources could be of use to a bank. Short-term paper issued in wholesale markets and hot money corporate deposits are no longer the answer for periods of market instability or banking sector crisis. Bank Treasury departments quickly realized the need to become ever better friends with bond markets. Some market commentators were

concerned as to whether investors would step up to a buy the new wave of bonds issued by the troubled banking industry. But, central banks and governments acted decisively, and the sector was stabilized. Record low interest rates and quantitative easing (QE) ensured demand.

As banks became more reliant on bond markets for funding, those markets, too, were undergoing dynamic changes. Total global bond market issuance – both government and corporate – soared to record levels as banks lent less in shrinking balance sheets in response to higher capital and liquidity requirements. But at the same time, bank bond trading desks began to provide less market making as holding inventory became more capital intensive and risk limits were tightened. Increased transparency requirements made bond dealing even less profitable. Many banks cut staff, replaced senior traders with less experienced ones, and exited segments altogether. With over 150,000 corporate bond issues in the European market alone – each with different credit risks, maturities, coupon, optionality, and terms – it has been argued that high-frequency traders (with different skill-sets and priorities) could never replace dedicated market makers.

In 2014, sell-side institutions began to raise concerns on the state of bond market liquidity given its growing importance. Evidence cited included lower secondary market turnover ratios and smaller trade sizes. More generally (and subjectively), dealers worried about problems in executing large orders without a significant price impact and degraded immediacy in certain markets. Sensitivity was heightened by several market disturbances where market liquidity abruptly diminished or temporarily dissipated. Examples included the mini flash crash in U.S. Treasuries in October 2014, the turmoil after the Swiss central bank unexpectedly removed the euro peg in January 2015, and the market shocks in August 2015 sparked by concerns over the Chinese economy.

Soon it became difficult to pick up any financial publication without reading about the great bond market liquidity debate. Many of the most prominent figures in finance – from the ranks of central banks, regulators, government, buy-side, and academia – weighed in on the topic.

Liquidity is notoriously difficult to both define and measure. A simple interpretation is the ability of investors to transact on a timely basis in good size without significantly impacting price. In assessing liquidity, it is important to gauge its resilience as conditions change. Academic research has identified four dimensions that may be used to measure market liquidity:

- Depth (ability to execute large trades)
- Tightness (spread between bid and offer prices)
- Immediacy (speed of execution)
- Resilience (price reversion following disturbances)

All that was universally agreed upon was that liquidity is an essential element of well-functioning markets, being key to price discovery; execution; cost of capital; cost of dealing;

investor confidence and risk appetite; risk management; and market stability and resilience.

Many challenged the concerns of the dealers, honing in on the fact that bid-ask spreads have remained low and measures of price impact of trades have been fairly stable. Investor trading strategies have evolved to more “buy-and-hold” approaches. Many investors say that while they may have to work harder to move positions, they can still get deals done. While not “market-makers,” larger investors are helping by becoming “price makers” where they declare prices at which they will buy or sell bonds. Electronic trading platforms and automation (“electronification”) – while not yet perfect or fully unified – are aiding liquidity and promoting efficiency. Finally, many cite the fact that – while market makers provide liquidity in normal markets – they have never been wholly reliable in crisis conditions as they are not in the business of “catching falling knives.”

Some focus has turned to the liquidity position of asset managers. If their investors are spooked by markets and want their money back, what happens if asset managers cannot find buyers? Some point to Exchange Traded Funds (ETFs), which hold a portfolio of bonds. Asset managers respond that they have performed extensive studies of redemption behavior under extreme market conditions, and have structured portfolios to meet demands. Funds have tools to deal with tail-risk events, such as swing pricing (investor leaving the funds when in crisis pay increased transaction costs), redemptions-in-kind (investor receives securities in the portfolio instead of cash), and gates (limitation of redemptions for a short period).

One thing for certain (at least for now) is that there will be no rolling back of the clock on regulation. Banks (and thus taxpayers) are now safer. Some regulators feel that some reduction of liquidity is a good thing. In the pre-crisis market there was a “liquidity illusion,” where

market participants assumed there would always be a price so they could take on what turned out to be excessive risk. Liquidity disappeared when it was needed most, and its fragility should never be forgotten. The dealer community is focusing attention on newer initiatives that could make it even more difficult for market-making and liquidity, including the Fundamental Review of the Trading Book (FRTB), EU Bank Structural Reforms, and Financial Transaction Taxes.

So where are we now on this debate? Regulators acknowledge that we are in a “brave new world” that is working well enough for now. But, the cumulative effects of the mass of new regulation are not yet fully known, especially as full implementation is not yet complete. The new market structure has never been tested in a crisis.

Well-functioning secondary markets are key to the continued robust primary market upon which the global economy has come to depend, as investors will not buy new bonds if they are having difficulties with the ones they already own. Super low rates, QE, and a benign credit cycle

have made for near perfect bond markets conditions where investors compete for supply. Even the most lowly rate sovereign credits are able to issue on attractive terms, with one recently defaulted country launching a successful 100-year bond. What happens when these conditions change? At least there is always some natural and largely captive demand from central banks and banks, collateral providers, and insurance companies and pension funds that match longer-term liabilities with assets.

Central banks have learned more about intervening in bond markets through QE, in addition to their historic focus on stabilizing banks. For now, authorities are focused on collecting and analyzing more high quality and uniform data. The need for a better understanding of linkages and likely behaviors in disrupted markets is fully appreciated.



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06



CREDIT RISK AND ALM

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What does credit risk have to do with asset and liability management (ALM)? Plenty! The risks faced by financial institutions are diverse, but interconnected. Financial institutions attempt to manage risk, among other ways, through product features, such as variable interest rate products, to mitigate the interest rate risk arising from changes in interest rates.

These efforts can, of course, affect future levels of credit risk. As rates rise, borrowers have to pay higher interest, and this heightens the risk that borrowers will be unable to make those higher payments, which naturally raises concerns among financial institutions about credit risk.

Effective credit risk management, therefore, needs to incorporate a framework integrated with the overall ALM process. This is critical for financial institutions as they trade off interest rate risk for credit risk. This is where the Asset and Liability Committee (ALCO) plays a key role. In the first instance, an effective credit risk management system should have three main elements:

- Risk scoring or loan grading
- Stress testing and
- Loan loss reserving

These elements must be embedded in the financial institution's credit and lending policies. These policies form part of a living document that changes and adapts as new regulations are introduced and as the institution's business strategy develops.

Risk Scoring

Following are key principles of an effective credit policy:

- Risk scoring models should be designed so that consistent measurements can be applied to similar types of loans.
- A good risk scoring model should include both objective and subjective factors that give an accurate reflection of a borrower's ability to repay debt.
- If a model is too objective, it can create a "black box" that lenders will try to circumvent.

- If a model is too subjective, lack of consistency results, which can create additional risk in the loan portfolio.

The key is finding the right balance between regulatory scrutiny and adequate flexibility for lenders to pursue transactions acceptable to the financial institution's risk profile.

Stress Testing

The Dodd-Frank Act requires the largest financial institutions to carry out stress tests, and guidance has been given on stress testing for community banks with assets over US\$10 billion. This guidance suggests that institutions should calculate and document their relevant loss rates for two-year stressed scenarios according to a base line, adverse circumstances, and severely adverse circumstances.

Naturally, these losses are carried forward to the income statement and the balance sheet, where the capital ratios are ultimately assessed. A robust stress testing process will leverage the risk-scoring models to assess the actual impact of each of the stress scenarios carried out. The institution's ALCO has to be made aware of these results, as the bank may be required to raise additional capital and funding.

Credit Risk Assessments and Mitigants

Many banks have developed their own internal rating models to form their own view of customer creditworthiness. These internal models also help banks reflect on why rating agencies may not agree with each other.

Internal rating models have also enabled banks to obtain capital treatment advantages, balanced by the significant costs to developing and sustaining these models.

Setting Credit Limits

Best practice dictates establishment of a credit risk appetite for each counterparty, industry, and group to which there is actual or potential exposure. Limits should also be set to cover the overall exposure to the highest risks (as these are the most likely to default and, hence, to create losses for the bank).

ALCO should be aware of the approaches utilized in considering issues related to the availability of liquidity and capital. A bank should organize its ALCO and Executive Committee structure in a way that ensures that ALCO has ultimate authority over credit risk policy.

A sensible approach is to ensure that the credit risk appetite for better quality clients is higher than for the weaker clients. However, one must consider "what-if" scenarios, allowing the re-setting of lower limits in anticipation of credit deterioration.

Other mitigants include use of credit derivatives, and possibly structured financings.

Credit Products

It is very important to understand the borrower's business and its funding base. It is equally important to ensure that borrowers are well positioned to meet their objectives.

A lender should feel confident that the borrower is trying to neutralize the effect of market risk movements (including changes in interest rates and exchange rates), and that they borrow in currencies that match their assets and liabilities appropriately. Just as ALCO reviews the bank's ALM to measure the potential effect of rate changes, so should the borrower regularly undertake a similar review. Borrowers or counterparties who run significant mismatches must be treated with caution, as handsome profits today could easily turn into large losses tomorrow.

ALCO, moreover, should consider carefully how best to raise funds for the bank. Debt investors have different objectives, and some are seeking higher (gross) returns than others.

Debt Structure

In this respect, it is important to be able to offer investors different types of debt instruments.

Subordinated debt, for instance, not only offers higher returns than other forms of debt, but also provides an extra layer of protection for unsecured creditors, in addition to shareholders' equity. Unsecured creditors will be very focused on how much asset value could be lost before their own debt is at risk.

The relative rates of return for different levels of seniority will vary according to the strength of the counterparty, reflecting the risk of loss. A senior secured creditor will be in the safest position, albeit at a low return, while an ordinary shareholder is in the riskiest position, and expects a much higher return.

Banking versus Trading Book

As we know, the banking book positions generally reflect assets intended to be held until maturity (e.g., bank loans). The trading book positions tend to reflect instruments held for a short period of time and then sold (e.g., a portfolio of bonds and shares). Credit risk obviously has to be considered for both, but even more so for banking book positions.

Deterioration in the creditworthiness of borrowers within the trading book could result in difficulties in selling the asset later. Therefore, when acquiring an asset and reviewing it on an ongoing basis, it remains critically important to be aware of issues that may affect a borrower's creditworthiness.

Pricing Credit Risk

In simplistic terms, credit pricing is driven by default probability, exposure, loss given default, and the cost of the capital a lender is required to hold to support its lending activities. All these have to be covered to allow a bank to break even. Credit risk costs are, therefore, higher for higher-risk clients and/or for longer-term lending.

In this context the evaluation and monitoring process is fundamental. Anomalies should be fully communicated, also to ALCO, so that everyone is aware, particularly if default is a possibility.

Loan Loss Reserves (Provisioning)

Eventually one has to decide whether a loan loss provision needs to be raised to cover an expected shortfall.

Trading book assets are valued daily according to market price, which ought to include any inherent expectation about credit risk and ultimate shortfall (so an additional provision is, perhaps, not necessary). Clearly however, if the bank held a significant proportion of the debt issue and did not believe the holding could be sold at the stated market price, then an adjustment would be necessary.

For banking book assets, clear concerns should be manifested before taking action. Initially, when concern arises, interest income should no longer be accrued to profits on a daily basis; it should be suspended and only credited to profits on receipt of payment. This ensures that the principal loan amount does not increase with capitalized interest.

When concerns are heightened that the principal may not be repaid, the likely shortfall should be assessed and a provision raised.

In assessing the level of provision required, the likelihood of default should be considered, and if this should occur, the level of shortfall that could

be expected. Predictions, alas, are always fraught with uncertainty. It is certainly not an exact science, but auditors have to be satisfied that the view expressed is within the realm of reason. In addition to specific provisions (against identified problems), banks are also required to charge general provisions, which reflect problems at the balance sheet date which are yet to be recognized (there is always a lag period before information is known).

One may take the view that the information base is typically two months out of date, and, therefore, two months' worth of recent annual provision charges should be applied (if this is deemed to be a reasonable proxy).

Much debate has occurred in recent years over the provisioning approach, with many participants unhappy with the accounting treatment (believing that it does not provide an accurate view of asset quality).

A new bank, which is adding new high-risk loans and charging high rates of interest, will not detect problems with the loan book at an early stage, and profits will appear impressive. However, problems will inevitably emerge in later years, when the "expected losses" begin flowing through.

New rules under IFRS 9 recognize that a loan is acquired at the outset with a loss expectation. Therefore, going forward, through analyzing cash flows over the life of a financial obligation and applying a default-probability factor, an appropriate discounted value can be obtained.

ALCO and Credit Risk

Our recommended operating model is that ALCO have effective authority to monitor, and ultimately approve, all operational aspects that impact the balance sheet. By definition, therefore, that would include credit risk, as that is the biggest driver of most banks' regulatory capital requirement. The best-practice infrastructure is shown in Exhibit 1. Exhibit 2 shows the interplay of risks across the balance sheet.

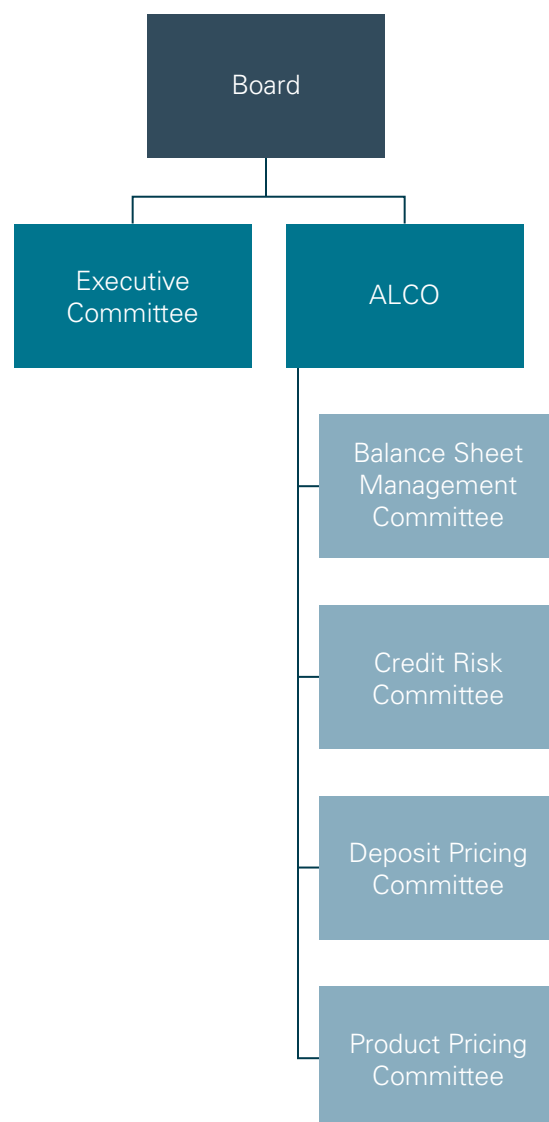


Exhibit 1: Best Practice Board and Executive Committee Structure

Source: Choudhry (2012) The Principles of Banking. Reproduced with permission.



Exhibit 2: ALCO and Risk Committee Interaction

Source: Choudhry (2012) The Principles of Banking. Reproduced with permission.

Given the importance to the balance sheet, ALCO can only pursue its mission effectively if it has final authority on credit risk exposure and adherence to credit risk appetite. This means the overall policy of the Credit Risk Committee must be subject to ALCO review. Such an operating model is not unknown, but it is not common. The rationale is clear enough, however: ALCO has responsibility for through-the-cycle sustainability of the balance sheet. Credit risk exposure is the main negative impact potential on the balance sheet; therefore, ALCO must have oversight of it. This does not mean day-to-day running and minutiae of credit origination. It means approval of policies, monitoring of exposure and, approval authority on significant transactions and any changes to policy.

Of course, ultimately, the best credit risk mitigation is sound origination policy.

Conclusion

This article has attempted to reinforce the vital role of the ALCO in credit risk, as part of the wider balance sheet risk operating model. In order to be able to fulfill the mission effectively, the recommended approach is to operate a technical and pricing sub-committee structure reporting to ALCO.

This helps to ensure that ALCO has oversight of the credit risk policy in the bank, given that credit risk is the main risk exposure on the balance sheet, and that ALCO has primary and paramount responsibility for the balance sheet.



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07



FORMULATING ASSET ENCUMBRANCE RISK TOLERANCE: Regulatory Objectives and Best Practices

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Asset encumbrance refers to the existence of bank assets subject to arrangements to secure liabilities from which they cannot be freely withdrawn. It originates from transactions that are typically collateralized or asset-backed, such as repurchase agreements, securitizations, covered bonds, or derivatives.

Asset encumbrance not only poses risks to unsecured creditors that are unable to benefit from the liquidation of encumbered assets in case of insolvency, but also has stability implications since encumbered assets are not available to obtain additional funding in case of an unforeseen stress¹. As such, the topic has gained prominence in the regulatory community, with central banks and supervisors increasingly focusing on monitoring encumbrance levels and

ensuring that institutions consider asset encumbrance a key component of their risk management and decision making processes. One of the cornerstones of any effective risk management framework is the articulation of balance sheet risk appetite. The bank's asset encumbrance risk appetite or risk tolerance will describe the required level of encumbered or unencumbered assets and level of encumbrance risk that the bank is willing to accept. Agreeing on an appropriate asset encumbrance tolerance is no easy matter. The bank's Board of Directors needs to balance the perspectives of different stakeholders, such as unsecured creditors, equity holders, credit rating agencies, and regulatory bodies while maximizing the cost and capital efficiencies of using collateral and keeping sufficient flexibility to implement the agreed funding plans.

Formulating the Asset Encumbrance Tolerance

When drawing up the Board risk appetite statement, clarity and simplicity are paramount, and asset encumbrance is no exception. The statement should be formalized by the Board of Directors and articulated in the asset

¹ For a thorough discussion on the risks posed by asset encumbrance see Banal-Estanol et al. (2017).

encumbrance policy. Setting the risk appetite at the Board level ensures that the tolerance level is adequate to the overall business strategy and accommodative of future funding plans, and is in line with demands from key business activities, such as liquidity management, funding issuance or collateral management. It will also ensure that the Board takes on the responsibility for adherence to the set tolerance and periodical review and challenge (as it should do with all balance sheet risk exposures).

Similarly to other asset and liability management (ALM) disciplines, in general the Board will delegate authority on asset encumbrance matters to the Asset and Liability Management Committee (ALCO). Together with the Treasury function, they typically serve as the first line of defense in establishing the asset encumbrance tolerance with input and approval from the second line of defense, the Risk function.

The asset encumbrance tolerance can be defined in various ways, but should be articulated through both quantitative and qualitative statements. A risk appetite statement based solely on quantitative metrics may not provide sufficient clarity as to how asset encumbrance risk should be prudently managed. In addition, the set tolerance should encompass the whole bank and the different sources of encumbrance risk. It should be applied at the appropriate level, duly considering the setup of subsidiaries, the legal structure, and the agreed resolution strategy. Restrictions to the free transfer of collateral across the group may lead to intra-group asset encumbrance and may require stand-alone statements with separate metrics.

The asset encumbrance risk tolerance should be supported by a set of metrics acting as early warning indicators (EWIs), appropriately calibrated to avoid any unnecessary breach. Limits should also be reviewed and challenged at least annually. This can be undertaken within the internal liquidity adequacy assessment process (ILAAP).

In the following sections, we explore three approaches that institutions can explore in order to set their asset encumbrance risk tolerance.

Limits on the Amount of Encumbered Assets

A first approach to setting the asset encumbrance tolerance is to constraint the overall amount of encumbered assets. Limits could be set by using asset encumbrance ratios, such as the ratio of encumbered assets to total assets or the ratio of encumbered assets to matching liabilities. The asset encumbrance ratio can be adjusted to include encumbrance of off-balance sheet collateral. An adjusted asset encumbrance ratio is used by the European Banking Authority (EBA) to undertake its risk assessment of the European banking system and to apply more comprehensive regulatory reporting requirements. It has, therefore, been widely adopted by European banks².

An overarching, one-dimensional limit can capture the overall risk of encumbrance for a small to mid-size institution, but will become less reliable as the business becomes more complex. Appropriate sub-limits can be applied to capture asset encumbrance arising from different:

- Sources of encumbrance, such as covered bonds, repo, or derivatives
- Counterparties, such as encumbrance arising from central bank operations
- Subsidiaries (intra-group encumbrance)
- Terms or maturities

It is paramount to tailor any set of limits to the size and complexity of the institution. For those firms where asset encumbrance does not arise

² The metric used by the EBA corresponds to the ratio of encumbered assets and other collateral received and re-used to the amount of total assets and total collateral received. See e.g. EBA (2017).

naturally as a result of their business model or funding strategy, typically the simplest ones, it may be sufficient to confine encumbrance of assets to particular transactions through a qualitative statement, for example to those transactions with the central bank and those related to pledging the Treasury portfolio of highly liquid assets. As shown in Table 1, this is the approach prescribed by the Prudential Regulation Authority (PRA) to United Kingdom building societies operating under the administered and matched approaches. Quantitative limits on the amount of encumbered assets are indicated for smaller building societies with more complex positions that operate under the extended and comprehensive approaches³.

Table 1: Indicative Asset Encumbrance Limits for United Kingdom Building Societies

SUPERVISORY MODEL	ADMINISTERED	MATCHED	EXTENDED	COMPREHENSIVE
Description	Assets and liabilities are entirely in Sterling, and predominantly (>90%) subject to administered interest rates	Assets and liabilities are entirely in Sterling, and predominantly (>50% of total assets and >50% of total liabilities) on administered rates	Institutions are capable of managing more complex balance sheet positions, including higher levels of wholesale funding (some of which might be in Euros or US Dollars)	Highest levels of depth and quality of the risk management systems and controls, frequency and complexity of position and risk analysis. Widest range of instruments and currencies in which Treasury operations are carried out
Asset Encumbrance Limit	Encumbrance is only permitted with the Bank of England	Encumbrance is only permitted with the Bank of England and for market repo transactions	A maximum of 20% of total assets can be encumbered excluding encumbrance with the Bank of England	Asset encumbrance limits and sub-limits need to be determined by the Board

Minimum Amount of Unencumbered Assets

An alternative but sometimes complementary approach to setting the asset encumbrance tolerance is to set a minimum required proportion of unencumbered assets. The ratio of unencumbered assets to total assets or unencumbered assets to unsecured liabilities, such as deposit liabilities can be used. Since not all unencumbered assets are available to raise additional funding, these ratios are commonly adjusted to specify the proportion of unencumbered assets that are available to use as collateral or to re-hypothecate, for example by specifying particular securities that are eligible with counterparties or of certain credit quality. Appropriate sub-limits can be implemented if required.

It is important to distinguish the quantum of unencumbered assets from the bank's liquidity buffer or the counterbalancing capacity. Although the latter would generally consist of unencumbered assets, the quantum of these reserves is cash-flow driven (i.e. arising from short-term liquidity needs) whereas the overall proportion of unencumbered assets is driven by the firm's view to maintaining an adequate level of funding stability across the funding plan, minimizing detriment to unsecured creditors and the potential for the institution to rely excessively on collateral. As a result, market liquidity should not be the main defining factor in determining the overall quantum and characteristics of unencumbered assets⁴.

³ See PRA (2017).

⁴ Market liquidity will nonetheless be correlated with credit quality.

Scenario-based (Contingent) Tolerance

An institution may need to encumber additional assets when facing adverse developments outside its control, such as credit downgrades or a general loss of confidence. This is known as “contingent encumbrance” and can lead to significant losses. Pledging collateral, typically of decreasing quality, in an adverse scenario could result in rising haircuts and reduced availability of unsecured funding or increased pricing, to a point where secured and unsecured funding may become unavailable, uneconomic, or both.

A predefined protracted adverse scenario can be used to define a contingent risk tolerance by setting the quantum of unencumbered assets in relation to collateral needs. The encumbrance risk tolerance can then be expressed as a single statement that at all times the bank should maintain enough unencumbered assets (available for encumbrance or of certain credit quality) to meet collateral needs with a given confidence level.

The benefit of this approach is its transparency, since the quantum of unencumbered assets is determined in relation to contingent needs, providing more flexibility to accommodate future funding requirements and planned issuances. In addition, the adverse scenario will encompass different risk factors affecting different encumbrance sources, such as margin calls or increased overcollateralization levels resulting in a multi-dimensional approach. The downside is that scenario based collateral requirements are dependent on agreed assumptions and modeled outcomes and, therefore, need appropriate governance and validation. The calibration and compliance monitoring will also be more resource intensive, particularly in more complex institutions with large derivative books.

Conclusion

The Bank’s asset encumbrance risk appetite or risk tolerance describes the level of encumbered or unencumbered assets and level of encumbrance risk that the bank is willing to take, and can be defined in various ways. In this article, we have explored three approaches that institutions can use to set their asset encumbrance risk tolerance. While limiting the amount of encumbered assets has been widely used by institutions and regulatory bodies as the main back-stop against excessive encumbrance levels, institutions should also consider other approaches. The approaches can include setting minimum amounts of unencumbered assets, articulating a contingent encumbrance risk tolerance under a protracted adverse scenario, or a combination of different approaches.

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08

STEERING BASEL III's LIQUIDITY RATIOS

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1. Introduction

In the run up of the global financial crisis, banks funded some illiquid assets on a short-term basis to earn preferably high net interest margins. This extreme form of maturity transformation causes an inherent roll-over risk, which hits banks as soon as investors' risk appetite for bank bonds disappears.

Before the financial crisis, financial markets were liquid, and funding for banks was easily available at low cost. The emergence of the crisis showed how rapidly market conditions can change, leading to a situation that several institutions experienced severe liquidity issues, forcing either an intervention by the responsible central bank or a shutdown of the institution. Analogously to the thinking that markets are always liquid, banks did not consider a proper liquidity management as a crucial part of their daily operations. They rather had a pragmatic approach on measuring and managing their liquidity. This resulted in a more-or-less non-systematic view of liquidity risk as part of a bank's asset-liability management. As a consequence, the financial crisis showed that a sustainable liquidity management is crucial for a bank's survival. The crisis emphasized the importance of a proper liquidity management for financial institutions as well as regulators.

In the wake of the financial crisis, the Basel Committee of Banking Supervision introduced two complementary measures, the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR) to insure that banks are forearmed against future liquidity stresses. The objective of the LCR is to promote the short-term resilience of the liquidity risk profile of banks. To ensure this, banks are required to run a portfolio of unencumbered high-quality liquid assets (HQLA) that can be converted easily and immediately into cash. This liquid asset buffer should protect from a 30 calendar day liquidity stress scenario. In contrast to the LCR, the NSFR enquires banks to maintain a stable funding profile in relation to the

composition of their assets and off-balance sheet activities. A sustainable funding structure is aimed to reduce the risk that the bank becomes vulnerable to a broader systemic liquidity stress when its regular funding sources dry up. In this article, we will explain strategies to manage the LCR and NSFR properly to fulfill regulatory requirements, optimize the ratios, keep unfavorable P&L effects as low as possible and how to deal with interdependencies between these both ratios and other newly introduced Basel III ratios.

2. LCR-Management

The concept of the LCR is not per se new. Looking at national regulatory frameworks shows that there were, indeed, related concepts in place. For example, Germany's liquidity regulation (Liquiditätsverordnung, LiqV) should reduce banks' liquidity risk and imposed several restrictions onto German banks to ensure they meet their obligations when they come due. The regulator's aim was that banks have enough means to meet any kind of liabilities by setting a ratio in which net outflows are netted against a portfolio of liquid assets. Therefore, Germany's LiqV and Basel's LCR are quite alike. The difference is that the liquidity coverage ratio is, first, more volatile because maximum caps are within the ratio, and, secondly, it is more expensive because it is comprehensive and pretty conservatively calibrated. Lastly, LCR is more complex than the German LiqV because the LCR is a nonlinear concept since it features caps in the numerator and denominator, e.g. a maximum of 100% of Level 1 assets in the numerator, cliff-effects, such as " $\leq 30d$ "; " $>30d$ " maturity buckets; and unwinding.

2.1 Today's LCR

The LCR is a simple linear ratio. However, the need to cater for market particularities and to avoid regulatory arbitrage have introduced features that make the LCR-calculation looking complicated. Market particularities refer to the four different asset classes that are LCR-eligible: L1A, L1B, L2A and L2B. To impose a minimum quality to the liquidity reserve, the use of lower quality assets (L1B, L2A, L2B) is restricted by caps (red-colored in Figure 1):

		Minimum volumes for diversification (DA, §17) (like CET1, T1, TC)		
	Hair -cut ¹	Non-L1A -Floor	L1 -Floor	(L1 & L2A) - Floor
L1A	0%	≥ 30%	≥ 60%	≥ 85%
L1B	7%	≤ 70%	≤ 40%	
L2A	15%			
L2B	25% -50%			≤ 15%
		Non-L1A -Cap	Non-L1 -Cap	Non-(L1&L2A) -Cap

Figure 1: Caps (red) for Lower-quality Liquid Assets

Their analytical reflections are denoted in the LCR-formula – see Figure 3. A conceptual unwinding of all collateralized transactions of ≤ 30 days maturity (Repos, Reverse Repos, Collateral Swaps) ensures that the LCR cannot be moved/ arbitrated with these short-term transactions. They are denoted in the LCR-formula in Figure 3. The unwinding of a 30 days repo, L2B-collateralized, means that the expected

recovery of the posted collateral and the expected repayment of the cash leg is already acknowledged in today's LCR: the adjusted amount of L1A is the unadjusted amount minus the cash amount. The adjusted L2B-amount is the unadjusted L2B-amount plus the recovered L2B-collateral. The neutrality of short-term transactions is usually ensured by having a net effect of the product of haircut and market value) in both LCR-numerator and LCR-denominator. However, this does not neutralize the effect of short-term transactions in the caps, i.e. without unwinding overnight collateralized transactions could circumvent the caps. A bank that has only L2B-assets, could enter overnight collateral swaps giving Non-LCR-collateral away against L1A. The obtained L1A could be completely used to free all the level 2B-assets that have been capped away. With the unwinding, this overnight transaction (and all until 30 days maturity) are made "unhappen," i.e. no 2B-assets would be freed. Note that the caps inhibit a non-linear behavior: a bank that has 0 EUR L1A-assets, has 0 EUR liquidity reserve, no matter how much it has from all other asset types. If such a bank buys 1 EUR L1A-asset, its reserve could increase by actually (up to) 3.33 EUR (thus, the notion "leverage").

The example shown in Figure 2 demonstrates the maximum effect:

Category	Haircuts	With 0 EUR L1A		With 1 EUR L1A	
		Market Values	LyV	Market Values	LyV
L1A	0%	0.00	0.00	1.00	1.00
L1B	7%	2.51	2.33	2.51	2.33
L2A	15%	0.00	0.00	0.00	0.00
L2B	50%	0.00	0.00	0.00	0.00
Liquidity Buffer, without limits:			2.33		3.33
Excess Ly Amount:			2.33		0.00
LyBuffer, DA:			0.00		3.33

Figure 2: Potential Leverage Effect of L1A-collateral

Given is a bank that only holds a stock of 2.51 EUR L1B assets (with a haircut of 7% this results in a liquidity value of 2.33). The resulting LCR-reserve is 0 EUR, because of the expression $\min(2.33 \text{ EUR}, 100/30 \cdot 0, 100/60 \cdot (0+2.33), 100/85 \cdot (0+2.33 + 0)) (= 0 \text{ EUR})$. Buying 1 EUR L1A-assets changes the previous expression into $\min(2.33 \text{ EUR}, 100/30 \cdot 0, 100/60 \cdot (0+2.33), 100/85 \cdot (0+2.33 + 0)) (= 3.33 \text{ EUR})$. Thus, the additional 1 EUR L1A-reserve frees completely the 2.33 EUR L1B-reserve. The 1 EUR L1A has a conceptual LCR-value of "3.33 EUR" value for the capped bank, i.e. is extremely valuable.

$$LCR = \frac{LyBuffer^{CRR}}{NLO} \geq 100\%$$

$$LyBuffer^{DA} = LyBuffer^{without Limits} - \min(LyBuffer^{without Limits}, Excess Ly Asset Amount)$$

$$LyBuffer^{without Limits} = L_{1A}^{MV} + 93\% \cdot L_{1B}^{MV} + 85\% \cdot L_{2A}^{MV} + \sum_{i=1}^n (1 - hc_i) \cdot L_i^{MV}$$

$$Excess Ly Asset Amount = LyBuffer^{without Limits, adjusted} - \min(LyBuffer^{without Limits, adjusted}, \frac{100}{30} \cdot L_{1A}^{ADJ/ED}, \frac{100}{60} \cdot (L_{1A}^{ADJ/ED} + L_{1B}^{ADJ/ED}), \frac{100}{85} \cdot (L_{1A}^{ADJ/ED} + L_{1B}^{ADJ/ED} + L_{2A}^{ADJ/ED}))$$

$$LyBuffer^{without Limits, adjusted} = L_{1A}^{ADJ/ED} + L_{1B}^{ADJ/ED} + L_{2A}^{ADJ/ED} + L_{2B}^{ADJ/ED}$$

$$NLO = TO - \min(FEI, TO) - \min(IHC, 0.9 \cdot \max(TO - FEI, 0)) - \min(IC, 0.75 \cdot \max(TO - FEI - IHC, 0.9, 0))$$

TO : Total Outflows
FEI : Fully exempted inflows
IHC : Inflows with 90% outflow cap
IC : Inflows with standard cap (75% of outflows)

Figure 3: LCR Formula

2.2 LCR Forecast

When forecasting the LCR, asset and liability management (ALM) desks need to consider both: time and market environment. In addition to an extensive forecast period, they need to anticipate this timeline in a scenario as well as a moderate stress scenario. In this matrix, it is important for banks to figure out when their future LCR falls below internal and regulatory thresholds. Since the LCR is cash inflow and cash outflow adjusted weighted balance sheet figure, the bank's current and forecasted balance sheets are the core of a LCR-forecast. Generated from various assumptions, such as roll-over of existing business or assumption on new business, the future bank balance sheet and, with it, the future LCR can be derived. In this process, the bank's treasury needs to work closely together with other business units, such as the private client and corporate clients divisions.

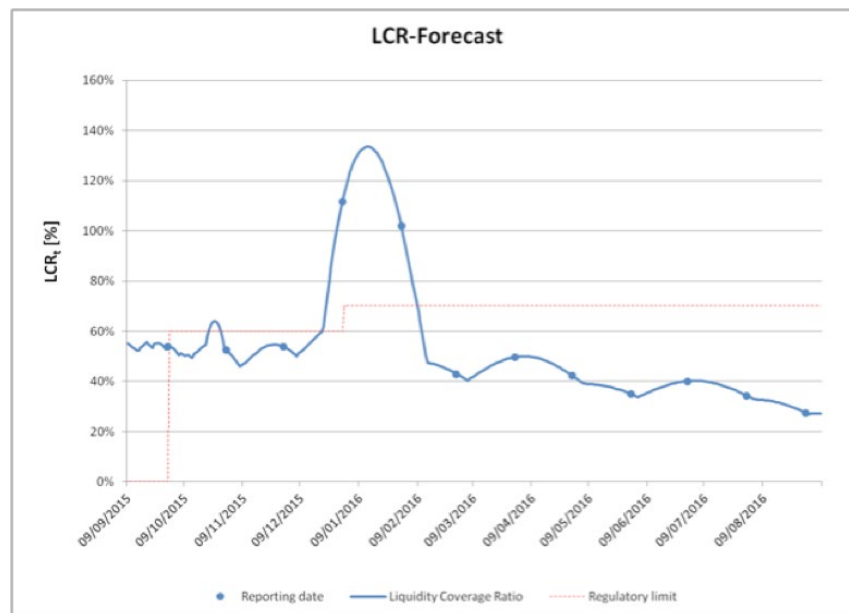


Figure 4: Example of LCR-forecast for the Next Year (= 366 days), Reporting Dates

In practice, forecasting the bank's LCR is not per se a new model. The internal going concern cash flow should be included in the expected prolongations rates, new business, potential prepayments, drawing on lines, and deposits. These cash flows of balance sheet items should correspond to today's balance sheet. Summing up all cash flows from infinity to the next reporting date, i.e. leaving out all cash flows between today and the next reporting dates returns the balance sheet at next reporting day and thus exactly what is needed to calculate the LCR of that next reporting date. Here, it is also possible to apply behavioral assumptions on future cash flows and to directly derive the balance sheet forecast without taking the deviation via cash flows. As the cash flow model already contains all going concern assumptions, there is no need for a separate new assumption set for the forecast. Moreover, it would be inconsistent to use different assumptions for the LCR forecast than for the cash maturity ladder. From an operational perspective, the LCR forecast should be linked to a bank's internal cash flow model. The change of balance sheet items is asymmetric between assets and liabilities: Term deposits are considered to be withdrawn whereas term loans are considered to be rolled-over. The asymmetry gives rise to major cliff effects.

2.3 Strategies to improve LCR

Banks can only manage their LCRs within the railings set by the Basel Committee. There are 13 types of assets and 16 types of liabilities distinguished to manage the LCR effectively - see Table 1 below.

Assets	Liabilities
Level 1	>30d Unsec.
Level 2	>30d Repo L1
Others	>30d Repo L2
>30d Unsec.	>30d Repo Others
>30d Repo L1	≤30d Unsec. Retail stable
>30d Repo L2	≤30d Unsec. Retail less stable
>30d Repo Others	≤30d Unsec. Wholesale op. Non-Bank
≤30d Unsec. Non-Bank	≤30d Unsec. Wholesale op. Banks
≤30d Unsec. Functional	≤30d Unsec. Wholesale non-op. Non-Bank
≤30d Unsec. Banks Cap. Mkts	≤30d Unsec. Wholesale non-op. Bank
≤30d Unsec. Corporate Sovereign Public Sector	≤30d Repo L1
≤30d Repo L1	≤30d Repo L2
≤30d Repo L2	≤30d Repo Others Central Banks
≤30d Repo Others	≤30d Repo Others Bank
	Credit Lines permitted
	Credit lines non-callable

Table 1: Asset and Liabilities Distinguished by Basel Committee to Manage LCR

Regarding the basic strategies banks can implement to steer their LCRs within this product matrix, we assume a model bank whose liquid asset buffer (LAB)¹ solely consists of Level 1 assets as shown in Table 2 below.

				Haircut	Liquidity Value
HQLA adjust.	L1 A Assets	100	Market Value	0%	100%
	L1 B Assets	0	Market Value	7%	93%
	L2 A Assets	0	Market Value	15%	85%
	L2 B Assets	0	Market Value	50%	50%
HQLA adjust.	L1 A Assets adjust.	100	Market Value		
	L1 B Assets adjust.	0	Market Value		
	L2 A Assets adjust.	0	Market Value		
	L2 B Assets adjust.	0	Market Value		
	LAB w/o Limits adjust.	100			
	LAB w/o Limits inventory	100			
Flow Assumptions	Outflows	140			
	Inflows	40			
	LAB w/o caps	100			
	Excess HQLA	0			
	Chargable Buffer	100			
	Liquidity Coverage Ratio	100%			

Table 2: Composition Liquid Asset Buffer Model Bank

Banks can manage their LCRs using the following strategy types: First, an asset-based strategy, second, a liability-driven strategy, and thirdly, a strategy which takes both banks' assets and liabilities into consideration.

¹ See Section 3 for the description of the functionalities of the liquid asset buffer.

Bonds	Others	90%	90%	91%	90%	92%	100%	95%	100%	91%	95%	100%	90%	92%	100%
	L2	99%	99%	99%	99%	100%	109%	103%	109%	99%	103%	109%	99%	100%	109%
	L1/ Cash	100%	100%	100%	100%	102%	110%	105%	110%	100%	105%	110%	100%	102%	110%
	Unsec. >30d	90%	90%	91%	90%	92%	100%	95%	100%	91%	95%	100%	90%	92%	100%
Unsecured, >30d, DD	FI - Other entities	95%	95%	95%	95%	96%	105%	100%	105%	95%	100%	105%	95%	96%	105%
	FI-Others	100%	100%	100%	100%	102%	111%	105%	111%	100%	105%	111%	100%	102%	111%
	FI-operational	90%	90%	91%	90%	92%	100%	95%	100%	91%	95%	100%	90%	92%	100%
	Retail, CSCP	95%	95%	95%	95%	96%	105%	100%	105%	95%	100%	105%	95%	96%	105%
Secured, >30d	Others	90%	90%	91%	90%	92%	100%	95%	100%	91%	95%	100%	90%	92%	100%
	L2	99%	99%	99%	99%	100%	109%	103%	109%	99%	103%	109%	99%	100%	109%
	L1	100%	100%	100%	100%	102%	110%	105%	110%	100%	105%	110%	100%	102%	110%
	Others	100%	100%	100%	100%	102%	111%	105%	111%	100%	105%	111%	100%	102%	111%
Secured, <30d	L2	100%	100%	100%	100%	102%	110%	105%	110%	100%	105%	110%	100%	102%	110%
	L1	100%	100%	100%	100%	102%	110%	105%	110%	100%	105%	110%	100%	102%	110%
	L1	100%	100%	100%	100%	102%	110%	105%	110%	100%	105%	110%	100%	102%	110%
LCR		Secured, <30d			Secured, >30d			Unsecured, <30d, DD				Unsec. >30d	Bonds		
	L1	L2	Others	L1	L2	Others	Retail, CSCP	FI-operational	FI-Others	FI - Other entities	L1/ Cash		L2	Others	

In the liability-driven strategy, one source of funding is replaced by another one. This substitution is mainly driven by the different stress outflow assumption made by Basel Committee. In particular, banks will substitute a funding instrument with high outflow assumption or shorter maturity with a funding instrument featuring preferable outflow assumptions or longer maturities respectively. Similar to the asset-based strategy, the bank's balance sheet remains stable. Based on the used funding products and their respective characteristics, there are 256 possible combinations. While most of the scenarios have no effect or produce weaker LCRs, only 99 of them cause a LCR improvement.

Secured, <30d				Secured, >30d				Unsecured, <30d, DD						Unsec., >30d	Capital	LCR	
L1	L2	Others-CB	Others-Others	L1	L2	Others-CB	Others-Others	Retail, stable	Retail, less stable	Non-Bank, operat., ins.	Bank, operat.	Non-Bank, non-operat.	Bank, non-operat.				
100%	100%	110%	100%	100%	102%	110%	110%	109%	109%	109%	107%	106%	100%	110%	110%	Secured, <30d	L1
100%	100%	110%	100%	100%	102%	110%	110%	109%	110%	107%	106%	100%	110%	110%	110%		L2
90%	90%	100%	91%	90%	92%	100%	100%	100%	99%	100%	98%	96%	91%	100%	100%		Others-CB
100%	100%	111%	100%	100%	102%	111%	111%	110%	110%	108%	106%	100%	111%	111%	111%		Others-Others
100%	100%	110%	100%	100%	102%	110%	110%	109%	109%	109%	107%	106%	100%	110%	110%	Secured, >30d	L1
99%	99%	109%	99%	99%	100%	109%	109%	108%	107%	108%	106%	104%	99%	109%	109%		L2
90%	90%	100%	91%	90%	92%	100%	100%	100%	99%	100%	98%	96%	91%	100%	100%		Others-CB
90%	90%	100%	91%	90%	92%	100%	100%	100%	99%	100%	98%	96%	91%	100%	100%		Others-Others
90%	91%	101%	91%	90%	92%	101%	101%	100%	100%	100%	98%	97%	91%	101%	101%	Unsecured, <30d, DD	Retail, stable
91%	91%	101%	92%	91%	92%	101%	101%	100%	101%	99%	97%	92%	101%	101%	Retail, less stable		
90%	91%	101%	91%	90%	92%	101%	101%	100%	100%	98%	97%	91%	101%	101%	Non-Bank, operat., ins.		
92%	92%	103%	93%	92%	94%	103%	103%	102%	102%	102%	100%	99%	93%	103%	103%		Bank, operat.
94%	94%	104%	94%	94%	95%	104%	104%	104%	103%	104%	102%	100%	94%	104%	104%		Non-Bank, non-operat.
100%	100%	111%	100%	100%	102%	111%	111%	110%	110%	108%	106%	100%	111%	111%	111%		Bank, non-operat.
90%	90%	100%	91%	90%	92%	100%	100%	100%	99%	100%	98%	96%	91%	100%	100%		Unsec., >30d
90%	90%	100%	91%	90%	92%	100%	100%	100%	99%	100%	98%	96%	91%	100%	100%		Capital

The asset-liability based strategy combines assets and liabilities in a more complex way and have an effect on the leverage ratio². This makes, however, the interrelation between Basel's regulatory ratios obvious. Having 224 possible asset-liability-combinations at hand, 106 combinations can improve a bank's LCR. By implementing such a strategy, ALM desks have a broader steering potential available.

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LCR		Secured, ≤30d			Secured, >30d			Unsecured, ≤30d, DD				Unsec., >30d	Bonds		
		L1	L2	Others	L1	L2	Others	Retail, CSCP	FI-operational	FI-Others	FI - Other entities		L1/ Cash	L2	Others
Secured, ≤30d	L1	100%	100%	100%	100%	99%	90%	95%	90%	100%	95%	90%	100%	99%	90%
	L2	100%	100%	100%	100%	99%	90%	95%	90%	100%	95%	90%	100%	99%	90%
	Others-CB	110%	110%	111%	110%	109%	100%	105%	100%	111%	105%	100%	110%	109%	100%
	Others-Others	100%	100%	100%	100%	99%	91%	95%	91%	100%	95%	91%	100%	99%	91%
Secured, >30d	L1	100%	100%	100%	100%	99%	90%	95%	90%	100%	95%	90%	100%	99%	90%
	L2	102%	102%	102%	102%	100%	92%	96%	92%	102%	96%	92%	102%	100%	92%
	Others-CB	110%	110%	111%	110%	109%	100%	105%	100%	111%	105%	100%	110%	109%	100%
	Others-Others	110%	110%	111%	110%	109%	100%	105%	100%	111%	105%	100%	110%	109%	100%
Unsecured, ≤30d, DD	Retail, stable	109%	110%	110%	109%	108%	100%	105%	100%	110%	105%	100%	109%	108%	100%
	Retail, less stable	109%	109%	110%	109%	107%	99%	104%	99%	110%	104%	99%	109%	107%	99%
	Non-Bank, operat., ins.	109%	110%	110%	109%	108%	100%	105%	100%	110%	105%	100%	109%	108%	100%
	Bank, operat	107%	107%	108%	107%	106%	98%	103%	98%	108%	103%	98%	107%	106%	98%
	Non-Bank, non-operat	106%	106%	106%	106%	104%	96%	101%	96%	106%	101%	96%	106%	104%	96%
	Bank, non-operat	100%	100%	100%	100%	99%	91%	95%	91%	100%	95%	91%	100%	99%	91%
	Unsec., >30d	110%	110%	111%	110%	109%	100%	105%	100%	111%	105%	100%	110%	109%	100%
	Capital	110%	110%	111%	110%	109%	100%	105%	100%	111%	105%	100%	110%	109%	100%

Table 5: Outcomes Balance Sheet Strategy

All possible strategies, can improve a bank's regulatory liquidity ratios but at the same time entail costs or even implicate a P&L impact. Hence, when managing Basel's liquidity ratios, treasurers need to choose between regulatory efficiency – keeping the LCR above internal and regulatory thresholds – and economic efficiency, such as fulfilling the LCR at reasonable cost.

2.4 Strategies to Improve P&L

To this point, we have discussed LCR-strategies from a pure regulatory point of view. Since the yield of HQLA is usually lower than banks' unsecured funding cost, LCR-compliance is a costly thing. Therefore, a bank should be P&L-conscious when designing LCR-strategies and an optimal strategy is the perfect trade-off between regulatory efficiency and economic efficiency. The incorporation of the P&L-layer is straight forward: each of the itemized products has a LCR-weight and a P&L-weight/contribution. If the LCR should be optimized locally (i.e. from a treasurer's point of view), the relevant P&L-weight is the funds transfer price. If the LCR should be optimized from a board level perspective, the relevant P&L-weight is the funds transfer price plus the (sales) margin. LCR-improving strategies are often P&L-reducing and vice versa. Nonetheless, some strategies improve both LCR and P&L: Reduce central bank deposits and buy government bonds which have supposedly higher yield or offer overdraft facilities to client to generate a 20% inflow and have usually a high margin.

In contrast, some other strategies are P&L-improving and LCR-neutral, such as changing unsecured overnight bank deposits to 30 day unsecured term deposits; switching within the same asset category (L1A/L1B/L2A/L2B) from low yield- to high yield assets of comparable credit risk; or moving from corporate deposits to retail deposits (with supposedly higher yield than corporate deposits).

For banks with an excessive LCR (e.g. 200%), strategies that reduce the LCR (in a controlled way) are also desirable. Examples are: Lending available cash to other financial institutions or corporations instead of hoarding it at the central bank. Lowering holdings of Level 1A assets and increase holdings of Level 2B assets, or Level 1A assets lending high quality LCR-collateral against lower quality LCR-collateral.

3. The LCR-based Liquid Asset Buffer

A key characteristic of the liquid asset buffer (LAB)³ is that the asset maturity is smaller than the its funding maturity. In positively sloped/normal yield curve environment this causes a negative carry. We refer to this negative carry as the “buffer costs” which are a kind of an insurance premium against an (un) expected liquidity stress. Banks are required to honor their obligations at any time and therefore it can be, depending on the intensity of additional stress, that liquidity is more important than profitability and therefore financial losses have to be taken into account when liquidating assets to ensure sufficient liquidity. For this purpose, the liquidity reserve has to be thoroughly and forward-looking managed to ensure assets to be available in times of financial stress. Funding that is generated through usage of these assets is also called “crisis liquidity.” The overall amount of crisis liquidity limits a bank’s funding risk and should be sized individually for any financial institution.

3.1 Design of the LAB

To ensure that the LAB is functional in times of crisis, it needs to be properly designed by the ALM desk. Regarding the strategic asset allocation of the LAB, ALM desks can select from the universe of high quality liquid asset, defined by the Basel Committee: Level 1A, Level 1B, Level 2A, Level 2B assets within their admissible caps – Level 1A up to 100% and Level 2 assets up to 40% of the liquidity reserve. Given the chosen asset allocation, treasurers can further choose, which kind of issuers and yield spectrum they want to allocate to the specific levels. When composing the liquidity reserve, it is useful to think of liquidity as costs of immediate liquidation. In a liquidity stress scenario, the liquidity reserve must be able to offset tremendous losses of funding. Hence, the composition of the liquidity reserve depends on the assets’ ability to generate liquidity during crises. This is primarily done by broad and deep markets with assets of high creditworthiness. Moreover, the amount of liquidity that can be generated during a crisis is also determined by the potential haircut of the single assets. The haircut is reciprocal to the asset’s credit quality of the asset: the better the creditworthiness, the smaller the haircut, and therefore the better the fungibility.

Apart from these pretty practical considerations, the Basel Committee allocates several types of issuers to different liquidity levels prone to different haircuts, e.g. government bonds which are allocated to Level 1A exhibit no haircut and therefore have a liquidity value of 100%. In contrast to this, debt securities held as Level 2 assets, such as corporate bonds or covered bonds, exhibit haircuts of 15%.

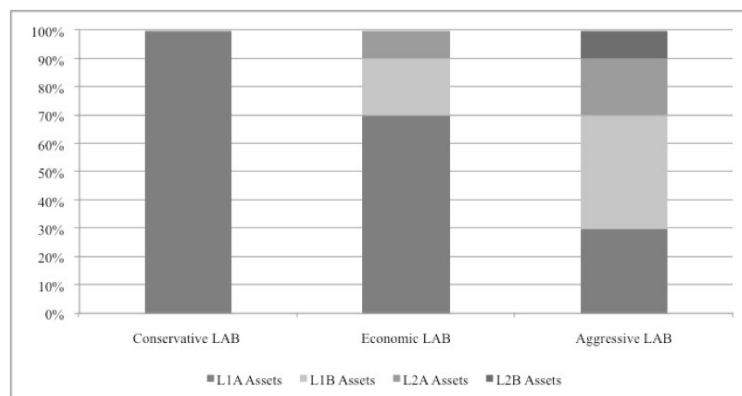


Figure 5: Hypothetical Liquid Asset Buffer Compositions

³ Liquid asset buffers are often also referred to as liquidity reserve, liquidity portfolio, liquid asset reserve, portfolio of reserve asset. Albeit these different paraphrases, this portfolio should be used to acquire funding on a sudden and pretty short-term basis.

We assume that the required absolute buffer size is set by the product of the net cash outflow, NCO, and the LCR-target level. Having the absolute buffer size at hand, the optimal relative decomposition within the applicable caps needs to be implemented. The buffer costs are determined by the yield of the assets and banks' unsecured funding cost. The lower the asset quality, e.g. L2B, the higher the yield, but also the higher the LCR-haircut. Assuming the same funding costs for all liquid asset categories, the lower category 2 should be increased if the yield is above a certain threshold r_2^* . To make two assets comparable in terms of LCR, their liquidation value (after haircuts) must be the same which is our departure point:

$$\begin{aligned} \text{Liquidation Value}_1 &= (1 - \text{HC}_1) \cdot \text{MV}_1 = (1 - \text{HC}_2) \cdot \text{MV}_2 = \text{Liquidation Value}_2 \\ \Rightarrow \text{MV}_2 &= \frac{(1 - \text{HC}_1)}{(1 - \text{HC}_2)} \cdot \text{MV}_1 \\ \text{Go for asset 2 if : } r_2 \cdot \text{MV}_2 &> r_1 \cdot \text{MV}_1 \\ \Rightarrow r_2 &> r_2^* = \frac{(1 - \text{HC}_2)}{(1 - \text{HC}_1)} \cdot r_1 \end{aligned}$$

Hence, it is recommendable to increase the weight of lower collateral (up to the caps), if the yield earns a higher return than the high quality collateral scaled with the haircut differentials. Thus, the optimal solution trades off the market valuation (in terms of yields) and the LCR-valuation (in terms of haircuts). When composing the LAB that way, partial or bank-wide large exposure limits needs to be taken in account.

3.2 Funding Structure of the of Liquid Asset Buffer

A bank-specific funding structure belongs to an optimal liquid asset buffer design. In principle, banks can choose between unsecured funding and derivative funding. While unsecured funding affects banks' balance sheets, derivative funding is conducted off the balance sheet. Using unsecured funding instruments, like rolling over funding frequently, such as quarterly money market transactions⁴, lowers the buffer's funding costs as a whole, keeps the LCR as well as NSFR-weights constant, and reduces the bank's leverage ratio (LR).

Determining the total funding costs of the liquidity reserve relies on the asset allocation (strategic and tactical) as well as on the chosen funding mix, e.g. balance sheet and derivative funding. Hence, the total costs depend on the sum of the weighted returns of the liquidity reserve and the sum of the weighted costs to fund this portfolio. Here, the liquidity reserve follows the common risk-return arithmetic: the higher the average credit quality of the LAB, is the lower is its return. Additionally, funding costs are higher for funding instruments which are on the bank's balance sheet.

In the following, four examples are provided how to design a liquid asset buffer and how the design of the buffer affects its total costs. The combinations of different asset and funding allocation are presented in Figure 6.

⁴ In practice, unsecured money market transactions are replicated by booking funding tickets for money market loans between the bank's internal funding desk and the desk running the liquidity reserve. While both desks normally belong to the bank's treasury department these replications indeed cause funding costs for the liquid asset buffer.

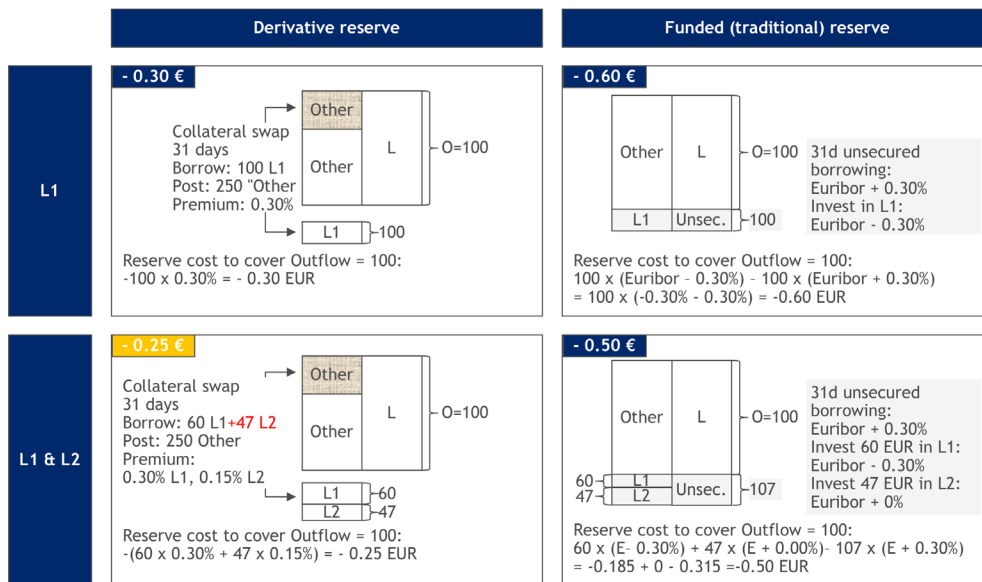


Figure 6: Liquid Asset Buffer Design

Our first combination is that an L1 asset is funded unsecured. The asset itself pays an annual coupon of 30 basis points below EURIBOR. The funding costs of this asset account to 30 basis points above EURIBOR. Hence, running a liquid asset buffer in this combination cost 60 basis point per annum.

Lowering the total asset quality by exchanging parts of the L1 assets with L2 assets works two-fold: enhancing the buffer's return and therefore lowering its total costs. Therefore having a liquidity reserve which consists of 60% L1 assets, which pay an annual coupon of 30 basis points below EURIBOR and 40% L2 assets⁵ which pays an annual coupon of EURIBOR flat with an unsecured funding of 30 basis points above EURIBOR, enhances the buffer's return to 18,5 basis points below EURIBOR and lowers to total costs of the liquidity reserve by roughly 17% to 50 basis point per annum.

Determining the costs of a liquid asset buffer which is funded by derivative funding is similar to "traditional" funding. As with the traditional funding, the total costs of derivative funding depends on the type of assets to be funded. When the ALM desk decides to have a LAB of L1 assets, the ALM desk uses collateral swaps⁶ to swap in these assets and earn the risk-adequate yields p.a. Assuming the ALM desk runs a liquidity reserve of L1 assets, it swaps in these assets and receives an annual coupon of 30 basis points below EURIBOR. Since no transactions are needed on the liability side of the bank's balance sheet, the total costs of the liquidity reserve accounts to 30 basis points per annum. This is a cut of 50% of the buffer's total cost in comparison to the initial costs of 60 basis points.

5 Since the Basel Committee demands that a liquid asset buffer should be composed of 40% of Level 2 asset at most, it seems illogical in the first place that our liquidity buffer contains 47% of Level 2 assets. This differential stems from the divergence in the notional and market value of the Level 2 assets. These asset are subject to a 15% haircuts using them in the liquidity reserve. Since we constructed our hypothetical liquidity reserves in terms of notional value, we need assets with an equivalent notional value of 47% ($40\% / (1-15\%)$) to derive the required 40% of market value.

6 In a collateral swap transaction two counterparties exchange two different assets. These assets are different in credit quality whereas the difference in the assets' quality is mainly a function credit quality, liquidity and complexity of the exchanged assets. In a collateral swap one counterparty receives the higher quality assets and posts the lower quality assets while the other counterparty pledges the high-quality asset and receives lower-quality ones. Collateral swaps differ from the "traditional" repo transactions because they do not involve cash in the first place and have longer maturities than repos, normally between one and five years. Under the current liquidity regulation, banks seek for higher rated asset to pledge them in their liquidity reserves. Therefore, collateral swaps has the favorable aspect that these banks can improve their LCR, if the collateral swap is longer than 30 days, and even their NSFR, if the collateral swap exhibits a maturity longer than a year.

To lower buffer costs further, banks can do collateral swaps with L1 assets and L2 assets. The liquidity reserve will consist of 60% of L1 assets and 47% of L2 assets. The coupon of the L1 assets is 30 basis points below EURIBOR and the coupon of the L2 assets is 15 basis points below EURIBOR. Given the 60-47 allocation of the liquidity reserve and no needed funding, maintaining this liquid asset buffer cost 25 basis points per annum.

As given by our examples, a bank can choose among a great variety of options how to design in terms of (credit) quality and funding mix. What a liquidity reserve need to look like in detail, every bank decides individually and in accordance to their business strategy, risk appetite, and internal limits how to design their liquid asset buffer.

3.3 Total Buffer Costs and Allocation to Risk Drivers

As outlined, costs of the LAB are driven by its' asset allocation and funding structure. Both dimensions are, again, driven by external and internal factors: such as a bank's risk-return considerations, capital charges on the assets held in the liquidity reserve and accounting volatility. The latter clearly depends on the IFRS categories in which these assets are booked. In addition, external factors are mainly driven by market conditions: here, for example the market's credit cycle and relative costs of different assets such as cash vs. various types of bonds. Based on the asset allocation and funding structure available the bank can, with Basel III's prescriptions, calculate the total buffer costs. Since an actual calculation of a multi-billion liquidity reserve would go beyond the constraints of this article, we explain the calculation mechanism using a stylized liquid asset buffer.

This stylized liquid asset buffer (see Table 2 in section 2.3) comprises a AAA-rated floating rate government bond with a 5 year maturity, TA, which pays an annual spread sA, of 35 basis points below EURIBOR, E. Since the bond is classified as Level 1A, Basel's liquidity regulation does not allocate a haircut to it. The liquid asset buffer has funding mix of long-term funding, TA, with a long-term funding spread, slt, of 80 basis points above EURIBOR and medium-term funding with a rolling funding maturity of TF, with an average funding spread, smt, of 10 basis points above EURIBOR. The percentage of the long-term funding is denoted with xlt. Hence, the share of medium-term funding can be written as (1-xlt). Having these variables at hand, the total costs of the liquid asset buffer can be written as:

Reserve	Costs	sbps	p.a.	/	1€Unexp.	Cash	Flow=
$E - sA - xlt * E + slt + 1 - xlt * E + smt \quad 1 - xlt * 1 - 1 - xlt * 1TF$							
$= -sA - xlt * slt - 1 - xlt * smt \quad 1 - xlt * 1 - 1 - xlt * 1TF$							

The long-term funding instrument covers 5% of the liquidity reserve's notional, while the remainder is funded medium-term. The long-term funding instrument is fixed for 5 years, the medium-funding rolled over on a semi-annual basis. The volume funded medium-term is divided in six commensurate tranches, 1/TF. Therefore, we can calculate the reserves cost of our buffer as:

$$Reserve\ Costs = -0,35\% - 5,00\% * 0,80\% - 1 - 5,00\% * 0,10\% 1 - 0\% * 1 - 1 - 5,00\% * 16 = 0,60\%$$

Running the LAB costs 60 basis point a year per one unit of unexpected cash outflow.

Allocating the costs of the liquidity to risk drivers is not always straight forward. Despite Basel's international liquidity regulation, national liquidity regulations can sometimes be stricter. The German BaFin which serves as Germany's regulator stipulates in its Minimum Requirements for Risk Management (Mindestanforderungen an das Risikomanagement, MaRisk) that banks need to implement a transfer price system properly reflecting the liquidity costs and risk of the banking organization. Moreover, Germany's LiqV requires banks to keep a liquidity reserve, which enables the banking organization to withstand a liquidity stress of one week ("survival period", SP) without any help from outside the bank itself, including assistance from central banks. Banks need to incorporate these costs into the product pricing. When pricing a money market deposit provided by large corporation, the bank needs to consider the LCR liquidity value of this term deposit (outflow assumptions) as well as the cost of maintaining the LAB.

These provisions need to be incorporated in the bank's funds transfer price. Implementing these regulatory requirements, the liquidity risk-adjusted transfer price, i_{reg} , can be written as:

$$i_{reg} = iFTP \cdot t - cLAB \cdot 1 - ILCR \cdot tLCR - tSP \cdot 360 - cLAB \cdot 1 - ISP \cdot t_{sp} \cdot 360 \cdot t$$

Where $iFTP$ is the bank's funds transfer price for tenor of the deposit, t . The costs of the liquid asset buffer are denoted as $cLAB$ whereas the deposit's liquidity values and horizons of the liquidity coverage ratio and the survival period are denoted as $ILCR$ and ISP as well as $tLCR$ and tSP .

Given a short-term funds transfer price of 16 basis points⁷ for the deposits tenor of 6 months (182 days), the regulatory-defined horizons of the survival period of one week (7 days) and the liquidity coverage ratio of one month (30 days), and the respective liquidity values for a corporate deposit, 0% for the SP and 90% for the LCR, the liquidity risk-adjusted transfer price, based on the cost of the liquidity reserve, for a corporate deposit is calculated as:

$$i_{reg} = 0,16\% \cdot 182 \cdot 360 - 0,60\% \cdot 1 - 90\% \cdot 30 - 7 \cdot 360 - 0,60\% \cdot 1 - 0,00\% \cdot 7 \cdot 360 \cdot 360 \cdot 182 = 12,9 \text{ bps}$$

Including regulatory costs into the deposit rate of a corporate deposit decreases the revenues for the liquidity providing corporation. At first sight, including the costs of current regulatory provisions lowers banks funding costs. With closer attention, this is not a decrease of funding costs but partial re-allocation, since these "savings" of funding costs are absorbed by additional liquidity reserve requirements.

⁷ There are 101 ways to formulate a funds transfer price system within a banking organization. We assume that 16 basis points can be considered as a fair and reasonable price for a 6-month term deposit. For designing and implementing a FTP-system in a banking organization.

NSFR-Management

4.1 Demarcation to LCR

The net stable funding ratio (NSFR) is an addition to the liquidity coverage ratio and yields at the long-term funding of banks. Simply speaking, the NSFR reflects “The Golden Banking” which states that long-term assets should be backed by long-term liabilities to reduce roll-over risks. Therefore, the NSFR is the golden banking rule put in one single ratio. While the LCR covers a maximum time horizon of 30 days, and, therefore, the short end of the funding curve, the NSFR targets the medium-term and long-term spectrum of banks’ funding curves – see Figure 7 and Table 6.

„1 year -inflow rate“		30days - inflow rate			30days - withdrawal rate		„1 year -withdrawal rate“
1-RSF	NSFR(RSF)	LCR	Assets	Liabilities	LCR	NSFR (ASF)	1-ASF
1 - haircut	haircut	1 - haircut	HQLA	≤ 30 days	5% -100%	95% - 0%	5% - 100%
50% - 100%	50% - 0%	50% - 100%	≤ 30 days	(30d, 1 year]	0%	100%	0%
		0%	(30d, 1 year]	> 1 year			
0% - 35%	100% - 65%		> 1 year	Equity			

Figure 7: Balance Sheet View LCR and NSFR

Ratio Dimension	Liquidity Coverage Ratio	Net Stable Funding Ratio
Time Horizon	30 days outflows to be covered by ...	Assets that remain ≥ 1 year to be funded by ...
Liquidity Assumptions	... 30 days inflows	... Liabilities that remain ≥ 1 year
	... HQLA (separated risk buffer)	1 year outflows to be covered by ...
		... 1 year inflows
Liquidity Risk	Addresses short-term (≤30d) roll-over risk	Addresses long-term (≤ 1 year) roll-over risk
Ratio weights	Weights % correspond to changes in volumes (1 - weights% are (sticky) volumes)	Weights % correspond to (sticky) volumes (1 - weights % are changes in volumes)
Type of Stress Scenario	Short-intensive stress scenario	Long-term, modest stress scenario
Comparability	Is like a 30 days NSFR with dedicated liquidity buffer	Is like a 1 year LCR without separated risk buffer
Fund Transfer Price	FTP: LCR-weights% (cost liquidity buffer)	FTP: NSFR-weights (cost of long-term funding)

Table 6: Comparison Between LCR and NSFR

By introducing the NSFR, the Basel Committee targeted banks’ structural, medium-term and long-term liquidity positions by limiting their maturity transformation. Thus, the NSFR strengthens a bank’s medium and long-term funding at the expense of short-term funding, which was not reliable in the financial crisis. In particular, the NSFR requires banks to maintain a stable funding profile in relation to the composition of their assets and off-balance sheet activities. This specific funding profile is intended to reduce the likelihood that market disruptions will erode a bank’s liquidity position in a way that would increase the risk of its failure and potentially lead to broader, market- wide systemic stress. Therefore, the NSFR defines the minimum acceptable amount of stable funding based on the liquidity characteristics of a

bank's assets and business activities over a one-year horizon. The NSFR was designed to complement the shorter-term LCR and promote structural changes in the liquidity risk profiles of banks away from short-term funding mismatches and towards more stable, longer-term funding of assets and business activities. Therefore, the metric measures the amount of stable funding as a proportion of the total requirement for such funding. Thereby the NSFR can be used to monitor and control the level of dependency on volatile short-term wholesale markets, as a key of the structural balance sheet ratio and is basically calculated as 100% required amount of stable funding available divided by the available amount of stable funding. In essence, the purpose of the NSFR is to control the level of maturity transformation that a bank undertakes.

As with the LCR, the Basel Committee allocated different liquidity values, or, in case of the NSFR, different funding values to single products. While the NSFR's numerator determined the available funding, the denominator determines the funding needs for different products. Albeit the intended benefits, it is the large weakness of the NSFR (as well as of the LCR) is that either the ratios or the model in combination just focus on one currency and not at the multicurrency liquidity risk a bank is normally exposed to.

4.2 Strategies to Improve NSFR

To steer the NSFR properly, banks may follow four different strategies: reduction of the balance sheet, enlargement of the balance sheet, or an exchange of assets and an exchange of liabilities. To clarify our example, Table 6 reports the calibrations variable for NSFR.

	Type of Asset	Required Stable Funding	Available Stable Funding	Type of Liability	
A1	Cash	0%	0%	Deposits from Institutional Investors <6mth	L1
A2	High-liquid assets	5%	50%	Deposits from Institutional Investors 6mths – 12mths	L2
A3	Securities	15%	90%	Deposits from private customers, non-relationship bank < 12mths	L3
A4	Loans to institutional clients <6mths	15%	95%	Deposits from private customers, relationship bank < 12mths	L4
A5	Loans to institutional clients 6mths – 12mths	50%	50%	Other clients < 12mths	L5
A6	Loans to institutional clients > 12mths	100%	100%	Bank Capital, other funding sources	L6
A7	Loans to other clients < 12mths	50%			
A8	Loans to other clients SA 35% > 12mths.	65%			
A9	Loans to other clients, SA >35% > 12mths.	85%			

Table 7: Calibration Variables for NSFR Enhancement

To implement a successful strategy to improve the NSFR the bank's current balance sheet is needed. In particular, one needs the required stable funding today, RSF0, and the available stable funding today, ASF0. In our example, we use numbers from a hypothetical large banking organization - RSF0 = EUR 500bn, ASF0 = 522bn, NSFR = 94%. Based on these numbers, the following table shows the possible alteration of the bank's balance sheet and the related new NSFR.

(II) Shortening the Balance Sheet: Assets (-) & Liabilities (-)										(III) Exchange of Assets (-, below) & Assets (+, left)										
0%	94%	90%	88%	87%	90%	100%	50%			0%	9%	10%	0%	50%	100%	50%	65%	85%	(+)	
5%	94%	90%	88%	87%	90%	87%		A1: Cash	94%	94%	95%	94%	98%	101%	99%	98%	100%	0%	0%	
10%	94%	91%	88%	87%	91%	87%		A2: High-liquid assets	94%	94%	95%	94%	98%	101%	97%	98%	100%	2%	0%	
15%	90%	91%	88%	88%	87%	91%	88%	A3: Securities	93%	93%	93%	94%	93%	96%	100%	98%	98%	98%	15%	
20%	94%	90%	88%	87%	90%	87%		A4: Loans to inst. clients <6mths	94%	94%	94%	94%	94%	94%	94%	94%	100%	0%	0%	
25%	98%	98%	94%	91%	90%	92%	94%	90%	A5: Loans to inst. clients 6mths - 12mths	91%	91%	92%	91%	91%	94%	98%	94%	96%	50%	
30%	101%	101%	97%	94%	94%	97%	94%	A6: Loans to inst. clients > 12mths	88%	88%	89%	88%	91%	94%	91%	92%	93%	100%	0%	
35%	98%	94%	91%	90%	94%	90%	91%	A7: Loans to other clients < 12mths	91%	91%	92%	91%	94%	98%	94%	95%	96%	50%	0%	
40%	99%	95%	92%	91%	95%	91%		A8: Loans to other clients SA 35% > 12mths	92%	92%	91%	90%	93%	96%	93%	94%	95%	100%	0%	
45%	100%	95%	93%	93%	95%	93%	92%	A9: Loans to other clients, SA >35% > 12mths	89%	89%	89%	89%	92%	95%	92%	93%	94%	95%	100%	0%
Assets																				
L1: Deposits from inst. investors <6mths	L2: Deposits from inst. investors 6mths - 12mths	L3: Deposits from private customers, non-relationship bank < 12mths	L4: Deposits from private customers, relationship bank < 12mths	L5: Other clients < 12mths	L6: Bank Capital, other funding sources															
0%	94%	98%	100%	101%	98%	101%														
5%	94%	98%	94%	97%	97%	94%														
10%	88%	91%	94%	94%	91%	99%														
15%	88%	91%	94%	94%	91%	94%														
20%	87%	91%	94%	94%	91%	94%														
25%	90%	94%	97%	97%	94%	98%														
30%	87%	90%	93%	93%	90%	94%														
35%	90%	95%	96%	96%	90%	100%														
40%	95%	99%	99%	99%	95%	100%														
45%	100%	100%	100%	100%	100%	100%														
(IV) Extension of balance sheet: Assets (+) & Liabilities (+)																				
0%	0%	0%	0%	0%	0%	0%														
5%	0%	0%	0%	0%	0%	0%														
10%	0%	0%	0%	0%	0%	0%														
15%	0%	0%	0%	0%	0%	0%														
20%	0%	0%	0%	0%	0%	0%														
25%	0%	0%	0%	0%	0%	0%														
30%	0%	0%	0%	0%	0%	0%														
35%	0%	0%	0%	0%	0%	0%														
40%	0%	0%	0%	0%	0%	0%														
45%	0%	0%	0%	0%	0%	0%														

Table 8: Outcome NSFR Calibration

Like in a two-dimensional Cartesian system we assigned quadrants to the four aforementioned single NSFR- strategies: Quadrant one, exchange of assets; Quadrant two, reduction of the balance sheet; Quadrant three; exchange of liabilities; and Quadrant four, enlargement of the balance sheet. Each quadrant is organized as a matrix in which a NSFR of 100% for one strategy (exchange of liabilities) and 101 % is the targeted ratio for the others.

In quadrant one, the target ratio is fulfilled by replacing long-term money market loans (A6) through sovereign bonds (A2) – exchange of assets. For the second quadrant, the targeted NSFR ratio of 101 % is achieved by reducing the total balance sheet. The asset side was reduced by EUR 40bn of long-term money market loans (A6) whereas the bank’s liabilities are reduced EUR 40bn of short-term de-posits from in institutional investors (L1) at the same time. Another strategy is to exchange liabilities. In particular, our hypothetical bank switches from EUR 40bn of short-term institutional deposits (L1) to long-term private customer deposits (L4) for whom the bank acts as the relationship bank. Lastly, a tar-get NSFR of 101 % can be achieved by acquiring private customer deposits (L3) through a promotional campaign and invest these means in sovereign bonds (A2).

4.3 Forecasting the NSFR

Under Basel III, banks are required to fulfill their NSFR at any given time. Since the liquidity weights heavily depend on the remaining maturities, e.g. capital market < 6 months. 0%; capital market > 6 months < 12 months: 50%, the NSFR is changing over time, mainly due to shortening remaining maturities of all balance sheet items. This brings about that, even without a willing alteration of the balance sheet, the NSFR might completely look different the very next day. It is possible that the NSFR “jumps” when some of the balance sheet items migrate from one weight to another, less favorable one. In the worst case, the bank would be NSFR-non-compliant the next day. To avoid any under fulfilling in this sense, it is absolutely crucial that banks implement a NSFR forecast. Besides the internal steering of the NSFR it is also demanded by regulators that banks report their expected NSFR. Since February 2015, banks in the euro area are expected to report their NSFR in one, two years and three years in their budgeted balance sheets, budgeted profit and loss statement as well as their funding plans on an annual basis. Thus, these time horizons should be part of the implemented forecast.

Since the NSFR consists of a weighted asset side (numerator) and a weighted liability side (denominator), a forecasted balance sheet is needed to forecast the NSFR properly. Here, it is worth to mention that this balance sheet forecast should be based on internal estimation on the outflows of current positions,

prolongations and new business. Then, in the last step the NSFR assumptions will be implemented on these forecasted balance sheets. To analyze the NSFR for some unfavorable but possible scenarios the balance sheet forecasted should be based upon negative scenarios as well.

4.4 NSFR-compliant Transfer Prices

The Basel Committee states: “A Bank should incorporate liquidity costs, benefits, and risks in the internal pricing for all significant business activities (both funded and unfunded).” Assets, especially loans, imply roll over risks since their legal maturity diverges from their economic maturity. This is ignored in traditional matched-maturity transfer pricing. Since NSFR is the external trigger, this risk should have already been incorporated in transfer pricing.

In economic distress, it is quite likely that banks would not roll-over loans in a troubled funding situation: With the NSFR, the regulator expects banks to roll-over granted loans and continuing to lend to real economy when it is most needed. The regulator believes that the short-term benefit of stopping to lend is outweighed by the long-term damage of the customer relation. This “guarantee” to roll over RSF% of loans makes them more expensive (than in a matched-maturity world). Roll-over risk can be hedged by stable funding, i.e. funding that is still available beyond maturity even in a distressed funding situation. Stable funding is more valuable (than in a matched-maturity world).

The NSFR is a model that makes roll-over risk visible, measurable and, as the most important feature, priceable⁸. Thus, funds transfer prices that are NSFR-compliant incorporate a roll-over premium. Usually, funds transfer prices are based on a matched-maturity notion: the transfer price of a loan is measured against the price of five-year funding. However, “matched maturity” is a static concept and not realistic: in the real world, positions don’t end at maturity, they are rolled over. If assets and liabilities match in their maturities, but feature different propensities of being rolled-over, there is a roll-over mismatch (risk). By making the asset-liability link matched-roll over⁹ (in contrast to matched funding) and incorporating this in the transfer price, the NSFR-cost are included and regulator’s requirement that funds transfer prices should reflect all cost, risks and benefits is fulfilled: roll-over risk is incorporated and priced. An example of a NSFR-compliant transfer pricing is given as follows:

⁸ Even if the NSFR-weights are inadequate for some banks, the NSFR still makes roll-over risk visible.

⁹ Matched roll-over ultimately means “NSFR-compliant.”

	Bucket	[0Y, 0.5Y)	[0.5Y, 1.0Y)	[1.0Y, 1.5Y)	[1.5Y, 2Y)	
1. Asset	2Y - bullet	100	100	100	100	
	RSF [%]	85%	85%	50%	50%	
	RSF [EUR]	85	85	50	50	
	Bucket	[0Y, 0.5Y)	[0.5Y, 1.0Y)	[1.0Y, 1.5Y)	[1.5Y, 2Y)	
2. Matched-maturity funding	2Y - bullet	100	100	100	100	
	ASF [%]	100%	100%	50%	0%	
	ASF [EUR]	100	100	50	0	
	NSFR	1.18	1.18	1.00	0.00	
	Bucket	[0Y, 0.5Y)	[0.5Y, 1.0Y)	[1.0Y, 1.5Y)	[1.5Y, 2Y)	[2.0Y, 2.5Y)
3. Roll-over matched/ NSFR-compliant	2Y - bullet	100	100	100	100	100
	ASF [%]	100%	100%	100%	50%	0%
	ASF [EUR]	100	100	100	50	0
	NSFR	1.18	1.18	2.00	1.00	0.00
	Tenor	0.5Y	1Y	1.5Y	2Y	2.5Y
4. Funding curve	Senior	0.50%	1.00%	1.50%	2.00%	2.50%
5. FTP	FTP,	2.00%				
	FTP,	2.50%				

Figure 8: NSFR-compliant Transfer Prices

Let's assume the bank has granted a 2Y-retail bullet loan (see 1. in Figure 8). The RSF-profile is 85 EUR/ 85 EUR/50 EUR/50 EUR. With a 50% roll-over factor in the last days the loan has a substantial probability of being rolled over. The ASF-profile of a matched-maturity interbank funding is 100/ 100/ 50/ 0. Because the benchmark trade is always an interbank or capital market benchmark, the FTP-concept involves two segments with different roll-over probability. A matched-maturity funding still exhibits roll-over risk (and thus is NSFR-non-compliant). A NSFR-compliant position is actually a 2.5 year capital market funding: The NSFR is fulfilled for the entire lifetime of the loan. Given an upward-sloping funding curve (see 4. in Figure 9), we obtain a FTP of 2.0% for the matched- maturity and of 2.5% for the matched-roll over/ NSFR-compliant transfer price. The 50 basis points difference can be interpreted as the cost of a regulatory roll-over hedge. If banks would have had addressed roll-over risk earlier on a voluntary basis, the FTP could be based on internal roll-over estimates. With the standardized NSFR, the regulator imposed a roll-over hedge and banks should incorporate the additional cost into their product pricing as described before.

5. Conclusion

This article described the most relevant questions and answers to manage the regulatory liquidity ratios LCR and NSFR.

The complexity of LCR stems from caps on low quality collateral categories and an unwinding mechanism. We have shown that the caps implicitly exhibit a leverage effect (up to 2.33 times) if Level 1 assets are the bottleneck. To address regulators' requirement of a forward-looking regulation, we discussed the necessity and implementation of a LCR-forecast, i.e. the potential evolution of future LCRs. Also strategies of how to improve the LCR and / or P&L, have been derived. LCR-strategies have been split into asset-based, liability-based and asset-liability strategies. Very few strategies are able to improve both LCR and P&L. With respect to liquidity buffer design, stated that the use of lower collateral quality depends on a positive trade-off between additional yield to be earned (market valuation) and the

LCR-haircut (regulatory valuation). The funding structure could be a traditional on-balance or a derivative structure which substantially reduces the funding costs. Ultimately, the buffer costs need to be allocated to products / portfolios, which we explained using a detailed example.

With respect to NSFR, we stated that the NSFR is like a 1-year-LCR but without a dedicated risk buffer. Long-term funding and short-term asset strategies substantially improve the NSFR. Analogously to LCR, the NSFR needs also to be forecasted to satisfy the new forward-looking requirement of the Basel III liquidity regulation. Using the example of a retail loan, we have shown how to incorporate the roll-over risk and NSFR-cost into product pricing.

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09



THE BACK PAGE

BY PROFESSOR MOORAD CHOUDHRY

Benchmark standards in risk management...

A question I like to ask people is, “What for you is the most powerful moment in the film Apollo 13?” (Naturally this presupposes that they’ve seen it!) Certainly there are a number of instances of high drama in the movie, which tells the story of the Apollo mission that never made it to the moon, and I’ve received a range of answers to this question.

For some, it is the moment when the explosion strikes, and both astronauts and Houston mission controllers are struggling to understand what’s happening. For others it’s the moment of triumph when, after the radio blackout on capsule re-entry has lasted for what seems an eternity, there appears suddenly and dramatically three parachutes in the sky, signaling that the astronauts are now safe and sound. But for me, there is one absolutely standout moment in what is a great film about an inspiring story: when the Flight Director, Gene Kranz (played by Ed Harris), discussing survival options with his team, announces passionately that, “Failure is not an option!”

Think about this statement for a moment. Its simplicity is matched by its elegance in encapsulating some essential truths that every risk manager would do well to adopt. First, it implies an adherence to minimum standards: the team’s objective absolutely must target success. Second, there is the unspoken commitment to excellence, which by definition requires continuous learning and development to ensure one remains at the forefront of knowledge and expertise. Third, is an essence of zero tolerance for negativity or pessimism: the team cannot even contemplate failure. And, fourth, is a culture of adaptation to the prevailing situation: when one of Kranz’s team states that they have never even simulated the problem they are now trying to solve, he doesn’t dwell on this fact for even an instant.

There is much in that statement for bank risk managers and, indeed, for those responsible for areas such as conduct risk. It’s an intriguing thought to consider whether not just total bank failures, such as some large high street banks in 2008, but other “failures,” such as derivatives mis-selling or Libor rigging, would have occurred if Wall Street and the City had emulated even a tiny element of the working culture that people like Gene Kranz represented.

We’ll leave the last word to the great man himself:

“ With a team working in this fashion, not concerned with voicing their opinions freely and without worrying about hurting anyone’s feelings, we saved time. Everyone became a part of the solution...Then I took a deep breath and concluded the meeting. ‘Okay listen up. When you leave this room, you must leave believing that this crew is coming home. I don’t give a damn about the odds and I don’t give a damn that we’ve never done anything like this before. Flight control will never lose an American in space. You’ve got to believe, your people have got to believe, that this crew is coming home. Now let’s get going!’ ”

— Gene Kranz, *Failure Is Not An Option: Mission Control from Mercury to Apollo 13 and Beyond*, New York, NY: Berkley Books, 2000.

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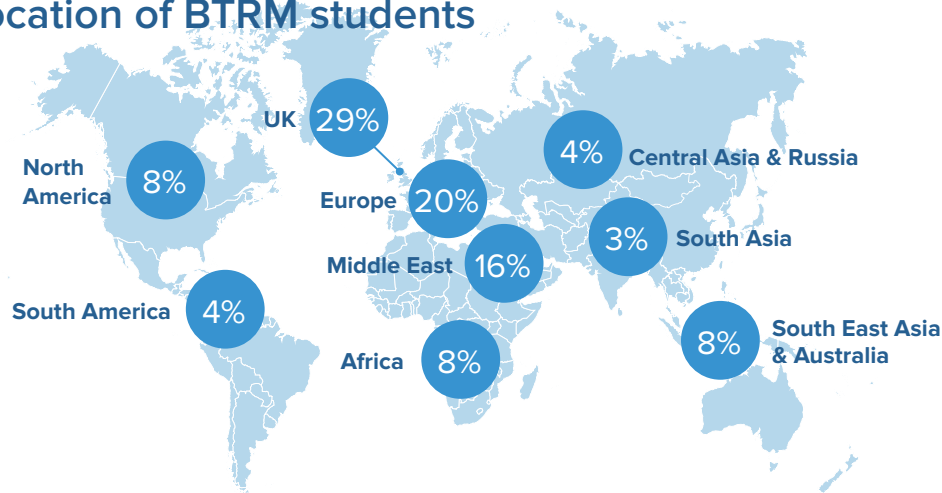
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