

WHITEPAPER

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Implementing Interest Rate Risk in the Banking Book: A Practical Approach

Summary

In April 2016, the Basel Committee on Banking Supervision (BCBS) published the final standard on capital framework for interest rate risk in the banking book (IRRBB). The final standard updated a set of principles laid out in 2004, to reflect changes in the market and supervisory practices.

The revised standard was created partly as a consequence of the sustained low interest rate environment since the banking crisis in 2007/8. Concerns among banks, supervisors, and governments have centered on banks' ability to absorb significant interest rate shocks. This revision to managing interest rate risk is mirrored in other enhancements to Basel III, including the Fundamental Review of the Trading Book (FRTB) and the Standardized Approach to Operational Risk.

The final standard details twelve principles for the management, control, and supervision of IRRBB, based on Pillar 2 of Basel III. It sets out a standardized framework, which a supervisor could mandate its supervised banks to follow, either as a distinct set of regulations, or as an enhancement to other regulations.

There are a range of issues associated with calculating IRRBB, including data management, calculating the results and reporting results to regulators in the right format at the right time. IRRBB results must further be consistent with other regulatory capital results for regulations including Basel III, stress testing, and International Financial Reporting Standards (IFRS) 9.

The implementation date of IRRBB is January 1 2018.

This paper summarizes the core Pillar 2 approach of IRRBB, and the alternative Pillar 1 approach of IRRBB used by certain banks in a few situations. It also includes a practical approach to implementing IRRBB.

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1. Introduction

Interest rate risk in the banking book or IRRBB—as defined by the Basel Committee—is the “current or prospective risk to a bank’s capital and earnings, arising from adverse movements in interest rates that affect the bank’s banking book positions.” Inadequate measurement, management, and control of IRRBB could threaten a bank’s capital base and future earnings. These concerns are especially true for the current global scenario, where interest rates in many countries are at historically low levels, and in some countries are in the negative zone. When interest rates normalize in the future banks could face a significant interest-rate risk. One of the ways this risk can be addressed is through the effective management and control of IRRBB. The Basel Committee, on April 21, 2016, published the final standard on capital framework for IRRBB. This standard specifies a set of prescribed principles that reflect changes in the market and supervisory practices since 2004, when the earlier guidance on interest rate risk management and supervision was published.

Earlier, in 2015, the Committee had proposed to shift the emphasis of IRRBB management from Basel Pillar 2 to Pillar 1. Under Pillar 2, banks used to rely on their internal measures, but the proposed Pillar 1 approach was designed to require banks to apply a more standardized regulator-designed approach. In its consultation, the Committee had presented two options for the regulatory treatment of IRRBB: a standardized Pillar 1 approach with minimum capital requirements and an enhanced Pillar 2 approach, which also covered elements of Pillar 3 on market discipline. The industry provided feedback on the feasibility of the Pillar 1 approach to IRRBB, highlighting the complexities involved in formulating a standardized measure of IRRBB. For a bank to be able to use this measure as a means to setting regulatory capital requirements, the measure would need to be both sufficiently accurate and risk-sensitive. After considering the industry feedback, the Basel Committee concluded that the heterogeneous nature of IRRBB would be more adequately captured in Pillar 2. However, the final standard also sets out the Pillar 1 standardized framework, which either the respective supervisor could mandate a bank to follow, or a bank could choose to adopt.

2. Overview of Key Changes

The final standard, which revises the Committee’s 2004 principles for supervision of IRRBB, sets out the supervisory expectations for identification, measurement, monitoring, and control of IRRBB by banks. As a part of this revised Pillar 2 approach, the key enhancements to the 2004 principles include:

- » **More extensive guidance on the expectations for a bank’s IRRBB management process** in areas such as the development of shock and stress scenarios. The guidance also addresses the key behavioral and modeling assumptions to be considered by banks in their measurement of IRRBB; and internal validation process which banks must apply for their internal measurement system (IMS) and models used for IRRBB. This kind of standardization is expected to introduce a level playing field across banks.
- » **Enhanced disclosure requirements** to promote greater consistency, transparency, and comparability in the measurement and management of IRRBB. Banks must disclose, among other requirements, the impact of interest rate shocks on their change in economic value of equity (ΔEVE) and net interest income (ΔNII), computed based on a set of prescribed interest rate shock scenarios.
- » **Stricter criteria for the outlier test.** Supervisors must publish tightened criteria for identifying outlier banks, which must now include comparison between the bank’s ΔEVE with 15% of its tier 1 capital, under a set of prescribed interest rate shock scenarios. Supervisors can implement extra outlier/materiality tests with their own specific measures.
- » **Updated standardized framework**, which supervisors could mandate their banks to follow or banks could choose to adopt.

3. Applicability and Implementation Timeline

The framework applies to all large internationally active banks on a consolidated basis. To ensure greater consistency and a level playing field between domestic and cross-border banks, this framework can be used for other banks and on any subset of entities of internationally active banks, at the discretion of national supervisors. The implementation of these principles have to be commensurate with a bank's nature, size, complexity, structure, economic significance, and general risk profile. Supervisors must gauge their responses, where appropriate, for banks with low IRRBB profiles. In particular, supervisors focus on systemic risks that are inherent in large, complex, or internationally active banks.

The banks are expected to implement these standards by 2018. Banks whose financial year ends on December 31 would be required to make the relevant disclosures in 2018, based on the information as of December 31, 2017.

4. Pillar 2: The Revised Principles

To prepare banks and supervisors to address IRRBB, the Committee has specified 12 interest rate risk principles. These principles set expectations for banks' identification, measurement, monitoring, and control of IRRBB and for the supervision of banks' IRRBB management. Principles 1 to 7 cover expectations for a bank's IRRBB management process. Principles 8 and 9 set out the expectations for market disclosures and banks' internal assessment of capital adequacy for IRRBB. Principles 10 to 12 address the supervisory approach to banks' IRRBB management framework and capital adequacy.

4.1 IRRBB MANAGEMENT PROCESS

The first seven principles describe the IRRBB management guidelines for banks and their IMS. Banks are expected to assess the capital for IRRBB through a comprehensive approach, that uses validated internal models and internal policy limits through metrics such as economic value and net interest income.

Principle 1. IRRBB must be specifically identified, measured, monitored and controlled. In addition, banks should monitor and assess credit spread risk in the banking book (CSRBB)¹.

Management of a bank's IRRBB should be integrated within its broader risk management framework and aligned with its business planning and budgeting activities. Banks must identify the IRRBB inherent in products. Products and activities that are new to a bank must undergo a careful pre-acquisition review to ensure that the IRRBB characteristics are well-understood and subject to a predetermined test phase before being fully rolled out. Before introducing a new product, hedging or risk-taking strategy, adequate operational procedures, and risk control systems must be in place.

Principle 2. The governing body of each bank is responsible for oversight of the IRRBB management framework and the bank's risk appetite for IRRBB. Monitoring and management of IRRBB may be delegated by the governing body to senior management, expert individuals, or an asset and liability management committee (ALCO) or its delegates. Banks must have an adequate IRRBB management framework, involving regular independent reviews and evaluations of the effectiveness of the system.

The governing body need to be informed regularly (at least semiannually) on the level and trend of a bank's IRRBB exposures. If a bank runs significant IRRBB exposures or has positions in complex IRRBB instruments, such reviews can be conducted more frequently. If governing bodies delegate the task for developing IRRBB

¹ CSRBB is the asset/liability spread risk of credit-risky instruments that is not explained by IRRBB and by the expected credit/jump-to-default risk. As per the final standard, changes to risk-free rate, market duration spread, reference rate, and funding margin fall within the definition of IRRBB while changes to market liquidity spreads and market credit spreads are combined within the definition of CSRBB.

policies and practices to an ALCO, it must meet regularly and include representatives from each major department connected to IRRBB. The delegates include members with clear lines of authority over the units responsible for establishing and managing positions. Furthermore, adequate internal controls, along with regular reviews of the internal control and risk management processes, are required to ensure the integrity of a bank's IRRBB management process. Banks must make available to the relevant supervisory authorities, the reports written by internal/external auditors.

Principle 3. The banks' risk appetite for IRRBB should be articulated in terms of the risk to both economic value and earnings. Banks must implement policy limits that target maintaining IRRBB exposures consistent with their risk appetite.

The Basel Committee principle specifies that the risk appetite framework delineate delegated powers, lines of responsibility, and accountability over IRRBB management decisions; it must also clearly define authorized instruments, hedging strategies, and risk-taking opportunities. The governing body or its delegates approve all major hedging or risk-taking initiatives before implementation.

The governing body must set policy limits² and the interest rate movements used in developing these limits to represent meaningful shock and stress situations, including historical interest rate volatility and the time required to mitigate those risk exposures. Positions that exceed, or are likely to exceed, limits defined by the governing body or its delegates must receive prompt management attention and be escalated without delay. A policy has to be in place stating who to inform, how to communicate, and the action to be taken in response to an exception. All IRRBB policies must be reviewed periodically (at least annually) and revised, as needed.

Principle 4. Measurement of IRRBB should be based on outcomes of both economic value and earnings-based measures, arising from a wide and appropriate range of interest rate shock and stress scenarios.

A bank's IMS for IRRBB should be able to accommodate the calculation of impact on economic value and earnings of multiple scenarios, based on:

- » Internally selected interest rate shock scenarios addressing the bank's risk profile, according to its Internal Capital Adequacy Assessment Process (ICAAP).
- » Historical and hypothetical interest rate stress scenarios, which tend to be more severe than shock scenarios.
- » The six prescribed interest rate shock scenarios (see section 4.4).
- » Any additional interest rate shock scenarios required by supervisors.

A bank's stress testing framework for IRRBB will be used to assess the potential impact of the scenarios on the bank's financial condition, enable ongoing and effective review processes for stress tests, and recommend actions based on the stress test results. IRRBB stress tests play an important role in the communication of risks, both within the bank and externally with supervisors and the market through appropriate disclosures. Banks also perform qualitative and quantitative reverse stress tests to (i) identify interest rate scenarios that could severely threaten a bank's capital and earnings; and (ii) reveal vulnerabilities arising from its hedging strategies and the potential behavioral reactions of its customers.

In developing the scenarios, banks consider many factors, such as the shape and level of the current term structure of interest rates and the historical and implied volatility of interest rates. In low interest-rate

² Limits may be associated with specific scenarios of changes in interest rates and/or term structures, such as an increase or decrease of a particular size or a change in shape. Limits could be absolute or, under specific circumstances, breaches of limits can be tolerated for a short predetermined period.

environments, banks also consider negative interest rate scenarios and the possibility of asymmetrical effects of negative interest rates on their assets and liabilities. In addition, forward-looking scenarios can be used to incorporate changes in portfolio composition due to internal and external factors.

A bank must select scenarios that provide meaningful estimates of risk and include a range of shocks that is sufficiently wide to allow the governing body or its delegates to understand the risk inherent in the bank's products and activities. The scenarios have to be sufficiently wide-ranging to identify parallel and non-parallel gap risk³, basis risk⁴, and option risk⁵. Scenarios must be both severe and plausible, in light of the existing interest rate level and the interest rate cycle. Special consideration has been given to instruments or markets where concentrations exist, as those positions might be more difficult to liquidate or offset in a stressful market condition.

Principle 5. In measuring IRRBB, key behavioral and modeling assumptions should be fully understood, conceptually sound and documented. Such assumptions should be rigorously tested and aligned with the bank's business strategies.

Both economic value and earnings-based measures of IRRBB are impacted by many of the assumptions made to quantify risk, namely:

- » Expectations for the exercise of interest rate options (explicit and embedded) by both the bank and its customers under specific interest rate shock and stress scenarios.
- » Treatment of balances and interest flows arising from non-maturity deposits (NMDs) and the treatment of own equity in economic value measures.
- » The implications of accounting practices for IRRBB.

When assessing its IRRBB exposures, a bank must make judgments and assumptions about how an instrument's actual maturity or repricing behavior can vary from the instrument's contractual terms because of behavioral optionalities⁶. Modeling assumptions must be conceptually sound, reasonable, and consistent with historical experience. Banks must carefully consider how the exercise of the behavioral optionality varies—not only under the interest rate shock and stress scenario but also across other dimensions. Banks with the necessary skills and sophistication and with material multi-currency exposures, might choose to include, in their IMS, methods to aggregate their IRRBB in different currencies using assumptions about the correlation between interest rates in different currencies.

Banks must be able to demonstrate that behavioral assumptions are appropriate. All changes to the assumptions of key parameters must be documented, for example, by comparing the economic value of equity measured under their IMS with the standardized framework. Banks periodically perform sensitivity analyses for key assumptions to monitor their impact on measured IRRBB, specifically economic value and earnings-based measures. Banks must review significant measurement assumptions at least annually and more frequently during rapidly changing market conditions. The most significant assumptions underlying the system must be documented and understood by the governing body or its delegates. Documentation includes descriptions on how those assumptions could potentially affect the bank's hedging strategies.

3 Gap risk describes the risk arising from the timing of instrument rate changes.

4 Basis risk describes the impact of relative changes in interest rates for financial instruments that have similar tenors but are priced using different interest rate indices (bases) (e.g., an asset priced off LIBOR funded by a liability priced off US Treasuries).

5 Option risk arises from option derivative positions or from the optional elements embedded in many bank assets, liabilities, and off-balance sheet items, where the bank or its customers can alter the level and timing of their cash flows.

6 Common products with behavioral optionalities include fixed rate loans subject to prepayment risk, fixed rate loan commitments, term deposits subject to early redemption risk, and non-maturity deposits or NMDs.

Principle 6. Measurement systems and models used for IRRBB should be based on accurate data, and subject to appropriate documentation, testing and controls to give assurance on the accuracy of calculations. Models used to measure IRRBB should be comprehensive and covered by governance processes for model risk management, including a validation function that is independent of the development process.

Instead of relying on a single risk measure, banks can use a variety of methodologies to quantify their IRRBB exposures under both the economic value and earnings-based measures. Methodologies can range from simple calculations based on static simulations using current holdings to more sophisticated dynamic modeling techniques that reflect potential future business activities. Banks' IMS must calculate economic value and earnings-based measures of IRRBB, as well as other measures of IRRBB prescribed by their supervisors, based on the interest rate shock and stress scenarios, as mentioned in Principle 4. The model must be sufficiently flexible to incorporate supervisor-imposed constraints on banks' internal risk parameter estimates.

Before authorization for use is received, the process for determining model inputs, assumptions, modeling methodologies, and outputs must be reviewed and independently validated for the development of IRRBB models. An effective validation framework includes three core elements. Evaluation of conceptual/methodological soundness, including developmental evidence. Continuous model monitoring, including process verification and benchmarking. Outcomes analysis, including back testing of key internal parameters. The review and validation results and any recommendations on model usage must be presented to, and approved by, the governing body or its delegates. Upon approval, the model must be reviewed, process verified, and validated at a frequency that is consistent with the level of model risk determined and approved by the bank. The ongoing validation process includes a set of exception trigger events that obligate the model reviewers to notify the governing body or its delegates in a timely fashion, to determine corrective actions and restrictions on model usage. Clear version control authorizations designated, where appropriate, to model owners.

IRRBB models might include third-party vendors. Model inputs or assumptions can be sourced from related modeling processes or submodels (both in-house and vendor-sourced) and must be included in the validation process. Banks document and explain model specification choices as part of the validation process. Banks that purchase IRRBB models must ensure there is adequate documentation of their use of those models, including any specific customization. If vendors provide input for market data, behavioral assumptions, or model settings, the bank is required to have a process in place to determine if those inputs are reasonable for its business and the risk characteristics of its activities. Internal audit must review the model risk management process as part of its annual risk assessment and audit plans.

Principle 7. Measurement outcomes of IRRBB and hedging strategies should be reported to the governing body or its delegates on a regular basis, at relevant levels of aggregation, by consolidation level and currency.

This reporting of risk measures compares current exposure with policy limits. Portfolios that are subject to significant mark-to-market movements must be clearly identified within the bank's IMS and subject to oversight, in line with any other portfolios exposed to market risk. Although the types of reports prepared for the governing body or its delegates vary based on the bank's portfolio composition, they include at least the following:

- » Summaries of the bank's aggregate IRRBB exposures and explanatory text that highlights assets, liabilities, cash flows, and strategies that are driving the level and direction of IRRBB.
- » Reports demonstrating the bank's compliance with policies and limits.

- » Key modeling assumptions such as NMD characteristics, prepayments on fixed rate loans, and currency aggregation.
- » Results of stress tests, including assessment of sensitivity to key assumptions and parameters.
- » Summaries of the reviews of IRRBB policies, procedures, and adequacy of the measurement systems, including any findings of internal and external auditors or other equivalent external parties.

4.2 DISCLOSURES AND INTERNAL ASSESSMENT

The Basel principles detail specific disclosures that are required from a bank regarding the methodologies used to measure IRRBB, along with the capital adequacy implications of the IRRBB exposure and the measures derived.

Principle 8. *Information on the level of IRRBB exposure and practices for measuring and controlling IRRBB must be disclosed to the public on a regular basis.*

Banks must disclose the measured ΔEVE and ΔNII under the prescribed interest rate shock scenarios (refer to Section 4.4). Banks use their own IMS to calculate the IRRBB exposure values, unless otherwise instructed by their national supervisor. In addition to providing quantitative disclosure, banks must provide sufficient qualitative information and supporting detail. This information is intended to enable the market and wider public to monitor the sensitivity of the bank's economic value and earnings to changes in interest rates. To understand the primary assumptions underlying the measurement produced by the bank's IMS, and to obtain an insight into the bank's overall IRRBB objective and IRRBB management.

For each supervisor-prescribed interest rate shock scenario, a bank must report ΔEVE for the current period and for the previous period based on its IMS and the change in projected ΔNII . To improve comparability between banks' disclosed levels of IRRBB, exposures are calculated on the following basis:

Change in economic value of equity calculated based on the IMS, using a run-off balance sheet⁷ and an instantaneous shock based on the result of the standardized framework if a bank chooses to adopt the framework or based on the framework mandated by the supervisor. Other specifications follow:

- » Banks exclude their own equity from the computation of the exposure level.
- » Banks include all cash flows from all interest-rate-sensitive assets⁸, liabilities, and off-balance sheet items in the banking book in the computation of their exposure. Banks disclose whether they have excluded or included commercial margins and other spread components in their cash flows.
- » Banks discount cash flows using either a risk-free rate or a risk-free rate, including commercial margins and other spread components, only if the bank has included commercial margins and other spread components in its cash flows.

Change in projected NII over a forward-looking rolling 12-month period compared with the bank's own best estimate 12-month projections, using a constant balance sheet assumption⁹ and an instantaneous shock. In addition, banks can include expected cash flows (including commercial margins and other spread components) arising from all interest rate-sensitive assets, liabilities, and off-balance sheet items in the banking book.

7 In the run-off balance sheet, existing assets and liabilities are not replaced as they mature, except to the extent necessary to fund the remaining balance sheet.

8 Interest-rate-sensitive assets are assets that are deducted from common equity tier 1 capital and exclude fixed assets such as real estate or intangible assets, along with equity exposures in the banking book.

9 In the constant balance sheet, total balance sheet size and shape are maintained by assuming like-for-like replacement of assets and liabilities as they run off. The maturing or repricing cash flows are replaced by new cash flows with identical features with regard to the amount, repricing period, and spread components.

In addition to required disclosures, banks are encouraged to make voluntary disclosures of their information on internal measures of IRRBB that would assist the market in interpreting the mandatory disclosure numbers.

Principle 9. Capital adequacy for IRRBB must be specifically considered as part of the ICAAP approved by the governing body, in line with the bank's risk appetite.

The contribution of IRRBB to the overall internal capital assessment must be based on the bank's IMS outputs, taking account of key assumptions and risk limits. The overall level of capital has to be commensurate with both the bank's actual measured level of risk and its risk appetite and be documented in its ICAAP report. Capital adequacy for IRRBB must be considered in relation to the risks to economic value, given that such risks are embedded in the bank's assets, liabilities, and off-balance sheet items. Banks have to consider capital buffers for the possibility that future earnings might be lower than expected. The capital adequacy outcomes for IRRBB are considered in a bank's ICAAP and flow through to assessments of capital associated with business lines.

4.3 SUPERVISORY ASSESSMENT

The new standards also provide detailed guidelines on conducting the supervisory reviews. These revised rules are stricter, more transparent, and offer details on how to identify outlier banks in terms of their capitalization of IRRBB. If supervisors suspect that a bank is inadequately capturing and capitalizing IRRBB, they can impose a capital calculation under the more conservative standardized approach, which is likely to lead to higher capital requirements.

Principle 10. Supervisors should, on a regular basis, collect sufficient information from banks to be able to monitor trends in banks' IRRBB exposures, assess the soundness of banks' IRRBB management and identify outlier banks that should be subject to review and/or should be expected to hold additional regulatory capital.

Jurisdictions that intend to perform an off-site review of their banks' IRRBB should put in place adequate reporting schemes to enable peer comparison of banks and identification of banks for additional on-site work. Supervisors should have the discretionary powers to collect additional information to assess banks' IRRBB, including the sensitivity of their IMS calculations to changes in key assumptions. Among others, information might be collected on the following:

- » Modeling of NMDs for IMS and sensitivity of a bank's economic value and earnings to changes in NMD assumptions.
- » The impact of assumptions used regarding products with behavioral optionalities.
- » Treatment of own equity in internal calculations and the extent to which it impacts the disclosed Δ EVE number.
- » Repricing gaps of cash flows associated with their interest-rate-sensitive assets, liabilities, and off-balance sheet items (by significant currencies).
- » Exposures to automatic interest rate options and the types of yield curve used for IMS purposes.
- » The level of Δ EVE if calculated using the standardized framework.
- » Economic value and earnings-based measures based on the prescribed scenarios, banks' internally developed scenarios, or other interest rate shock and stress scenarios.

Principle 11. Supervisors should regularly assess banks' IRRBB and the effectiveness of the approaches that banks use to identify, measure, monitor and control IRRBB. Supervisory authorities should employ specialist resources to assist with such assessments. Supervisors should cooperate and share information with relevant supervisors in other jurisdictions regarding the supervision of banks' IRRBB exposures.

At the time of assessment, supervisors must consider a bank's size and complexity. Supervisors evaluate whether a bank's IMS provides a sufficient basis for identifying and measuring IRRBB, particularly noting the key assumptions that affect the IRRBB measurement. Supervisors request and evaluate information about significant model or policy changes that have occurred between their regular reviews and concentrate their efforts on reviewing the most material models and policies.

Supervisors must review a bank's IMS outputs (including its IRRBB exposures based on both economic value and earnings-based measures) using at least the prescribed interest rate shock scenarios. Any additional interest rate shock and stress scenarios, along with the information disclosed by banks. Supervisors assess the adequacy of a bank's capital relative to its IRRBB exposures (against expectations set out in Principle 9) to determine whether the bank requires more detailed examination and potentially be subject to extra capital requirements and other mitigation action. This assessment is not limited to the outlier/materiality test.

Principle 12. Supervisors must publish their criteria for identifying outlier banks. Banks identified as outliers must be considered as potentially having undue IRRBB. When a review of a bank's IRRBB exposure reveals inadequate management or excessive risk relative to capital, earnings or general risk profile, supervisors must require mitigation actions and/or additional capital.

Supervisors must identify an outlier bank using the outlier/materiality test. Supervisors are mandated to implement at least one such test comparing the bank's maximum Δ EVE under the prescribed interest rate shock scenarios with 15% of its tier 1 capital, computed in line with the disclosure requirements. Supervisors can also impose more outlier/materiality tests, provided these tests are uniformly applied throughout the jurisdiction. For the additional test, the threshold for identifying an outlier bank must be at least as stringent as the proposed outlier test.

All banks are expected to hold adequate capital for the risks they take. When a supervisor determines that a bank's IMS is deficient in its IRRBB measurement, the supervisor requires the bank to improve its IMS and use the prescribed standardized approach. Moreover, if a bank's IRRBB management is deemed inadequate or it is found to have excessive risk relative to capital or earnings, or its general risk profile, the supervisor must require the bank to take one or more of the following actions:

- » Reduce its IRRBB exposures (for example, by hedging).
- » Raise more capital.
- » Set constraints on the internal risk parameters used by a bank and improve its risk management framework.

The reduction in IRRBB and the expected higher level of capital must be achieved within a specified time frame. Taking account of the prevailing financial and economic conditions, and the causes of IRRBB exposure exceeding the supervisory threshold.

4.4 INTEREST RATE SHOCK SCENARIOS

Designing effective interest rate change scenarios that are relevant to the business and are sufficiently stressful is a key element of IRRBB management. A shock, assumed to be at the current interest rate levels allows the change in economic value or earnings, and ultimately the effect on equity, to be computed. The

Basel Committee standard stipulates that banks apply the six prescribed interest rate shock scenarios to capture parallel and non-parallel gap risks for EVE, along with the two prescribed shock scenarios for NII, parallel shock up and parallel shock down. These scenarios are applied to IRRBB exposures in each currency for which the bank has material positions.

To capture the local rate environment, a historical time series ranging from 2000 to 2015 for various maturities was used to derive each scenario for a given currency. The six scenarios for EVE are:

- » Parallel shock up.
- » Parallel shock down.
- » Steepener shock (short rates down and long rates up).
- » Flattener shock (short rates up and long rates down).
- » Short rates shock up.
- » Short rates shock down.

National supervisors can, at their discretion, set floors for the post-shock interest rates under these six scenarios, if the floors are not greater than zero. The Committee acknowledges that shock sizes of different currencies reflect local conditions in a timely manner. Therefore, the Committee can periodically review the calibration of the interest rate shock sizes (for example, every five years).

5. Pillar 1: The Standardized Framework

The 2015 consultation had presented two options for the regulatory treatment of IRRBB: a standardized Pillar 1 approach with minimum capital requirements and an enhanced Pillar 2 approach with the updated principles. Industry feedback on the feasibility of the Pillar 1 approach to IRRBB highlighted the complexities involved in formulating a standardized measure of IRRBB. The Basel Committee's final standard emphasizes the use of the Pillar 2 approach. However, the final standard also sets out the standardized framework, which the respective supervisor could mandate a bank to follow, or a bank could choose to adopt.

The standardized approach in the final standard is similar to the approach proposed in last year's consultative paper. Using this approach, the Δ EVE under a scenario is calculated for each currency with material exposures, defined as over 5% of either banking book assets or liabilities). First, the interest-rate-sensitive banking book positions are classified as amenable¹⁰, less amenable¹¹, or not amenable¹². Next, all future notional repricing cash flows arising from interest rate-sensitive assets, liabilities, and off-balance sheet items, for each currency, are slotted into 19 predefined time buckets according to their repricing dates/maturities and based on their amenability to standardization. After that, the net notional repricing cash flows in each time bucket are weighted by a continuously compounded discount factor to get the risk-weighted net position. The resulting risk-weighted net positions are summed up to determine the EVE in a particular currency under a specific scenario. Then, add-ons for changes in values of automatic interest rate options are added to the changes in the EVE measure under each interest rate shock scenario on a per currency basis. Finally, the Δ EVE under the standardized framework is the maximum of the worst aggregated reductions to EVE across the six supervisory prescribed interest rate shock scenarios.

10 Amenable positions fall into two categories—fixed rate positions and floating rate positions—and include positions with embedded automatic interest rate options where optionality should be ignored for slotting of notional repricing cash flows.

11 A common feature of less amenable positions is the optionality that makes the timing of notional repricing cash flows uncertain.

12 Positions not amenable to standardization include non-maturity deposits, fixed rate loans subject to prepayment risk, and term deposits subject to early redemption risk.

The final standard, under the Pillar 2 approach, also allows banks to use the IRRBB models developed by third-party vendors, although banks must document and explain their model specification choices. Model inputs or assumptions can also be sourced from related modeling processes or sub-models, which can be both in-house and vendor-sourced. The final standard stipulates that when a supervisor determines that a bank's IMS is deficient in its measurement of IRRBB, the supervisor can require the bank to improve its IMS and use the standardized framework to calculate its IRRBB in terms of ΔEVE . This requirement could particularly affect smaller banks where systems are not well-equipped for such tasks. The use of models developed and customized by third-party vendors seems to be a good option both for smaller banks with fewer resources and for banks that do not have an adequate IMS in place.

6. An Implementation Approach

Implementing a solution that delivers IRRBB is a challenge, given that the regulations are merely principles yet to be adopted by regulators around the world.

The principles that apply to individual banks encompass the key issues of data consolidation and management, calculating the IRRBB results, and regulatory and business reporting. Importantly, the IRRBB results must be consistent with the results from other banking regulations, including Basel III, stress testing frameworks, and accounting frameworks such as IFRS 9 and Current Expected Credit Loss (CECL). The optimal solution is aligned with the commercial and operational demands of the business, so the solution is efficient and cost effective.

DATA MANAGEMENT

Data consolidation and management are central to the calculation of IRRBB results. The solution must be open and flexible, to integrate seamlessly into a bank's core application. This approach allows banks to consolidate data formats and standards, without needing to undertake extensive, complex, and risky application integration projects. A centralized data management platform must encompass data cleansing processes that allow banks to enforce their data quality standards. Banks must identify places where the data is missing, out of date, or in the wrong format, to ensure that the IRRBB calculations use accurate information from the start of the process, helping to deliver accurate results, on time and cost effectively.

Centralizing data management enables banks to leverage the same data to calculate results for Basel III, stress testing, and IFRS 9, and creates a systematic, automated, and consistent approach to implementing a regulatory compliance system that also meets the economic and operational demands of the bank.

Furthermore, the data platform must have comprehensive user access control and auditability to maintain integrity that can be demonstrated to regulators.

CALCULATING IRRBB RESULTS

Key to delivering accurate results efficiently and cost effectively is embedding the IRRBB formulae into the calculation application. This approach allows the full complexity of the requirements to be captured and maintained as they evolve. Some of these requirements are to be defined by regulators, such as changes in economic value of equity, or net interest income. Others, such as the specifics of the interest rate scenarios can be defined by the bank or regulators, in both cases regulation must be defined and maintained by each institution. In addition, the key behavioral assumptions, which are unique to each institution must be captured and maintained, as the regulations and the business evolve.

The calculation engine must be flexible enough to capture this mix of regulator and bank-defined metrics, without the need for extra programming, management, or technical support.

A fully integrated calculation engine and data management platform, ensures the accuracy, performance, and efficiency of the associated processes.

BUSINESS AND REGULATORY REPORTING

Central to IRRBB is the need for reporting, both to management, the Asset and Liability Committee (ALCO), regulators and wider stakeholders. The goal is to deliver effective day-to-day management of IRRBB, and the business, while also delivering accurate reports to the regulators. While the reporting requirements of IRRBB are to be defined by regulators in due course. A best practice approach for implementation utilizes templates to capture the results into formats required by regulators, formats such as XBRL, Microsoft Excel®, ASCII, and others.

The formatted approach allows for efficient, accurate, and automated reporting, which helps banks meet operational and regulatory compliance objectives.

This integrated regulatory reporting process allows banks to deliver regulatory reports for Basel III, stress testing and IFRS 9, using the same data and calculations. This approach allows banks to deliver consistent reporting of their positions from multiple perspectives, seamlessly and efficiently.

The optimal solution would also integrate business reporting and regulatory reporting, using a business intelligence layer. As banks embed Basel III, and IRRBB, into their day-to-day business operations, integrating business, and regulatory management can help managers align the two streams. This approach also enables managers to identify strategic options for the business, which can then be assessed and prioritized in terms of Basel III compliance.

References

Basel Committee on Banking Supervision, April 2016, "Interest Rate Risk in the Banking Book"—Final Standard ([link](#))

Basel Committee on Banking Supervision, June 2015, "Interest Rate Risk in the Banking Book"—Consultative Document ([link](#))

Basel Committee on Banking Supervision, July 2004, "Principles for the Management and Supervision of Interest Rate Risk" ([link](#))

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