

WHITEPAPER

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Interest Rate Risk in the Banking Book (IRRBB): Meeting the Practical Challenges

Highlights

- » The new Basel Committee on Banking Supervision (BCBS) standards for IRRBB come into force January 1, 2018. This paper looks at the standards from a practical implementation point of view and raises some of the main challenges.
- » Although the BCBS did not retain a Minimum Capital Requirement (MCR) based on standardized measures following industry feedback, the new IRRBB imposes tougher requirements for disclosure on two metrics: ΔEVE and ΔNII while also giving greater discretionary powers to the supervisor.
- » The main practical challenges fall under three headings: Data gathering, modeling, and governance.
- » IRRBB presents an excellent opportunity to put in place a reporting framework that enables the sharing of reports between different teams in the bank. Top management must grasp this opportunity with both hands.

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Introduction

In a world of low interest rates, the thought of what could happen if there is a sudden interest rate shock is very much at the forefront of bankers' minds. We are now seeing a divergence in monetary policies with the United States starting to raise interest rates; it might do so another three times this year. Meanwhile, other jurisdictions continue to maintain interest rates at historically low levels, or cut them even further. This divergence and recent market volatility are creating much uncertainty in terms of risk management. For many banks, tackling the interest rate issue and keeping their margins constant have become a top priority.

In April 2016, the Basel Committee on Banking Supervision issued standards for Interest Rate Risk in the Banking Book (IRRBB). The standards revise the Committee's 2004 Principles for the Management and Supervision of Interest Rate Risk. Those principles set out supervisory expectations for banks' identification, measurement, monitoring, and control of IRRBB, as well as its supervision.

The new IRRBB standards reflect changes in the market and supervisory practices which are pertinent in light of the recent exceptionally low interest rates in many jurisdictions. The revised standards are expected to be implemented by 2018.

Adhering to the IRRBB framework presents some major challenges. We conducted a snap poll of 285 industry professionals during a webinar that took place on March 5, 2017. It revealed that nearly a third (32%) saw "data gathering" as their biggest challenge in IRRBB compliance. A further 27% saw "building automated systems to support regular measurement and reporting" as the biggest challenge. Nearly a quarter (24%) named "building behavior models" as the biggest challenge, which can also be seen as dependent on gathering data and building systems. Only a small minority (6%) believed that "completing interest rate scenarios with stress and reverse scenarios" would be their top challenge. The remaining 11% named "setting up an appropriate governance framework" as their biggest challenge.¹

The Evolution of the New BCBS Standards

Before getting into the detail of the new standards, it is worth understanding the background and the process by which they were established. The earlier guidance on interest rate risk goes all the way back to July 2004. It includes a set of 15 principles for both the trading book and the banking book, of which two were dedicated to the banking book.

The new IRRBB standards follow a Consultative Paper published in June 2015, which set out a two-pillar approach for banks to guarantee that there is "appropriate capital to cover potential losses from exposures to changes in interest rates" and to limit arbitrage between the trading book and the banking book.

- » Pillar 1: Standardized Minimum Capital Requirement (MCR) based on two metrics, the Economic Value of Equity (EVE) and Net Interest Income (NII) measured under six interest rate scenarios
- » Pillar 2: A set of 12 principles to guide banks and supervisors in measuring risk and assessing capital adequacy internally

Feedback from the industry published in September 2015 unanimously rejected Pillar 1's standardized MCR, even as a fallback in Pillar 2, based on two main arguments: first, that there can be no one-size-fits-all model for the banking book given the diversity of products, plans, behavior, bank strategy, tax regimes and so on.

1. The poll was conducted during an interactive webinar hosted by Risk.net, AsiaRisk and Moody's Analytics on March 5, 2017.

And second, even if internal models were allowed in Pillar 1, the constraints on their calibration would be too restrictive or lead to inconsistent results in scenarios involving shocked interest rates.

A further quantitative impact study, which included the computation of MCR as described in Pillar 1 for 153 participating banks, confirmed the comments received earlier. On average, the materiality on NII was around three percent of CET1 capital. The materiality on EVE was significant but, looking at the standard deviation, scattered. For most of the larger banks, the proposed standard MCR would have led to a significant increase in the amount of capital to hold compared with one computed through an internal management system. Since this consultation, the IRRBB standards published in April 2016 are based on Pillar 2; Pillar 1 becomes a simplified optional framework, with a revision of its parameters and using the former Option 1 (based only on full EVE variations) for capital adequacy.

The New IRRBB: Executive Summary

Following the consultation, the important changes to the 2004 Principles are as follows:

- » **The only element of standardization** lies in the six interest rate scenarios for which variations of both EVE and NII are required
- » **A stricter threshold for identifying outlier banks** has been reduced from 20% of a bank's total capital to 15% of a bank's Tier 1 capital. In addition, interest rate risk exposure is measured by the maximum change in the economic value of equity under the prescribed interest rate shock scenarios
- » **More extensive guidance on the expectations for a bank's IRRBB management process**, especially in areas such as the development of shock and stress scenarios relying on validated internal models
- » **Enhanced disclosure requirements** to promote greater consistency, transparency, and comparability in the measurement and management of IRRBB. This section includes quantitative disclosure requirements based on common interest rate shock scenarios
- » **An updated standardized framework**, which supervisors could mandate their banks to follow or banks could choose to adopt

Nine Principles for the Banks

The following overview of the nine principles sets the context for practical steps towards compliance.²

PRINCIPLE 1: SCOPE

This principle reiterates that IRRBB is an important risk for all banks that must be identified, monitored, and controlled. Banks should also monitor Credit Spread Risk on the Banking Book (CSRBB).

PRINCIPLE 2: GOVERNANCE

Principle 2 describes the role and functions of the governing body, which is responsible for oversight of the IRRBB management framework.

PRINCIPLE 3: RISK APPETITE "DASHBOARD"

The governing body is responsible for setting consistent limits and measures to drive the business strategy in accordance with the bank's risk appetite. This principle underlines the importance of anticipation of specific scenarios and reactivity in setting limits accordingly.

2. For a detailed review of the principles, please refer to our white paper, A Summary of BCBS Interest Rate Risk in the Banking Book Directive (September 2016).

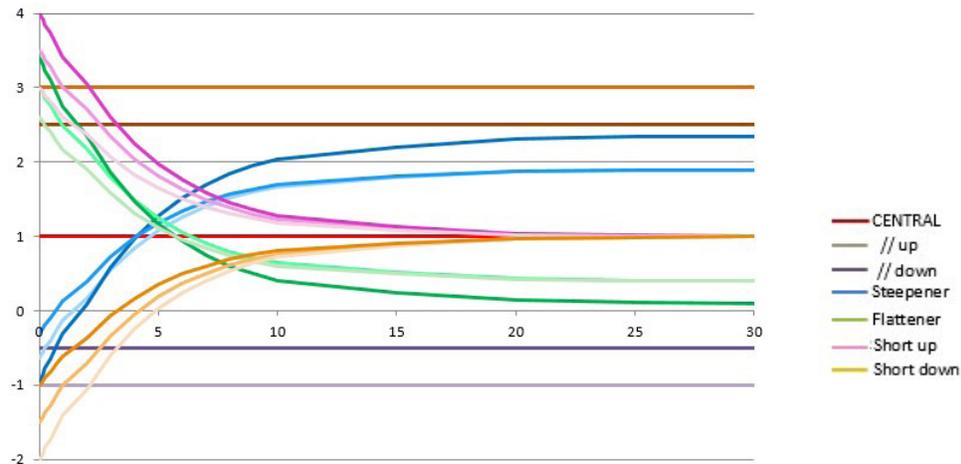
PRINCIPLE 4: MEASURES

Principle 4 establishes that IRRBB must be based on both economic values (EVE) and earnings (NII). These values quantify a change in present value and future profitability, respectively measured on a static stock running off or a dynamic stock including new or renewed business. These changes are of consequence for the interest rate scenarios.

The BCBS prescribes six interest rate shocks but in addition requires internal interest rate scenarios built for the internal capital adequacy assessment process and stress scenarios. In addition to these, reverse scenarios complete the requirement.

Figure 1 indicates what the six prescribed shocks would look like for the Euro, US Dollar, and Singapore Dollar, under the assumption of a flat curve of one percent for the stricken currency; parallel shocks, one upward and one downward; then two distortions of the curve, one steepening (short rates down and long rates up), and one flattening (short rates up and long rates down); and finally two scenarios impacting only the maturity, short rates up or short rates down.

Figure 1 The six prescribed shocks for EUR, USD, and USG



PRINCIPLE 5: MODELS

Measuring IRRBB EVE and NII requires modeling assumptions with complexity in line with the size and profile of the bank for: behavioral options like prepayment and early redemption of term deposits and fixed rate loan commitments, the run-off profile of non-maturing deposits, the duration of own equity, and the impact of accounting practices.

PRINCIPLE 6: PROCESS

Models used to measure IRRBB must be comprehensive and covered by governance processes for model risk management. They need to include a validation function that is independent of the development process. Essentially, while the governing body is responsible for the selection, calibration and management of the IRRBB models, it can rely on a third-party vendor for running these processes.

PRINCIPLE 7: REPORTING

The content of internal reporting to the governing body must be clearly detailed. It must cover not only measures of exposures but also information on the models themselves, including key modeling assumptions, and reviews of risk modeling policies and procedures.

PRINCIPLE 8: DISCLOSURE

Two annual reports are required for public disclosure: Table A for qualitative information and Table B for the Δ EVE and Δ NII under the prescribed scenarios. For the quantitative disclosure, the bank must disclose variations in EVE for its banking book under the six prescribed scenarios mentioned earlier. It must do so under some specific constraints, such as not including the bank's own equity, margin and spread flows, and run-off balance sheet in a repricing view. The bank must also disclose variations of projected NII over a rolling 12-month period in two balance sheet scenarios (see Figure 2).

In addition to the quantitative disclosure, banks must provide sufficient qualitative information and supporting detail to enable the market and public to monitor the sensitivity of the bank's economic value and earnings to changes in interest rates.

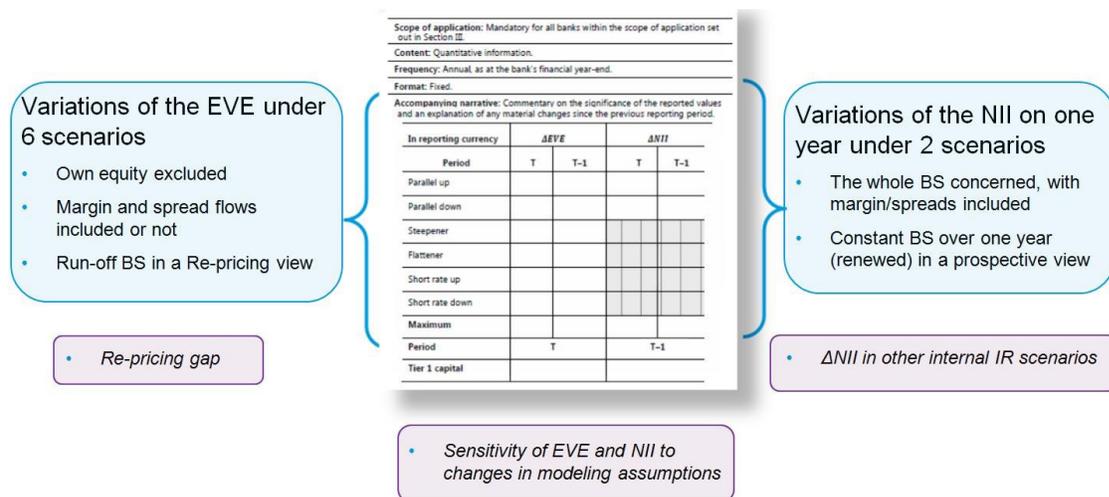
PRINCIPLE 9: CAPITAL

Whatever the disclosure, the capital assigned to IRRBB remains part of the ICAAP. However, explicit factors driving its evaluation are listed.

SUPERVISORY ASSESSMENT

In addition to the nine principles for banks, there are a further three principles providing detailed guidelines on conducting the supervisory reviews. In general, supervisory assessment might be stricter and more transparent than previously the case, with more discretionary powers given to local supervisors. The local supervisor might ask the banks to provide additional results such as the repricing gap, the variation of their earning in internal scenarios, or the sensitivity of metrics to the models' underlying assumptions. Local supervisors might, at their own discretion, review, and adjust the calibration of shock sizes of different currencies to reflect local conditions.

Figure 2 Quantitative disclosure



Some Strategic Considerations in IRRBB Compliance

Implementation of Banking Book Boundaries

The first practical challenge in implementing IRRBB lies with defining how transactions are mapped to the banking book or the trading book. Two different people in any bank are likely to give a different answer to the question, "Does this transaction belong in the banking or the trading book?"

It is vital that the same rules apply consistently across the entire group. Documentation of the boundaries must, therefore, be mandatory and must be precise if you want your reports and your calculations to make sense.

In collecting transactional data, there must be clear definitions for making the right choice for different types of asset across the group.

Disclosure Requires Clarity of Thought

Principle 8 (Disclosure) of IRRBB is focusing many minds from an Asset & Liability Management (ALM) perspective. Equity analysts are increasingly interested in understanding more about banks' balance sheets and already sending the banks some informed inquiries.

With interest rates expected to rise through 2017 and 2018, analysts are asking about NII sensitivity. In particular, they wonder how much NII might go up or down across a range of scenarios. Banks must balance NII sensitivity to rate changes against EVE sensitivity to rate changes, and relate those sensitivities to both equity analysts' and shareholders' expectations. Doing so requires greater clarity of thought than was previously the case, and as a result, the compliance effort can have a positive impact in terms of how banks structure their balance sheets.

That said, these issues are not straightforward for non-ALM and non-treasury specialists, so it is possible that shareholders and the general public will misunderstand. Disclosure under the new IRRBB standards is extensive. The specialists therefore face a considerable challenge: on the one hand in communicating balance sheet structures in a suitably thorough and nuanced way for analysts and supervisory bodies, while on the other giving adequate insight to a broader audience as is required in the BCBS text.

The Practical Challenges: Data, Modeling & Governance

The key questions for any bank as it tackles IRRBB are:

- » Data: we have it for managing credit risk and liquidity risk, but do we have the aggregated and granular data required to measure interest rate risk?
- » Modeling: what models are appropriate for the measurement of interest rate risk, and if we build such models, do we have the data required to calibrate them?
- » Governance: Can we take this opportunity to put IRRBB at the center of a framework not only for interest rate risk but also other risks, stress testing, and financial planning to give us a really holistic view of the bank?

Data Gathering Is the Top Challenge

Many banks are concerned that they simply do not have the historical data to model the scenarios outlined under Principle 5, largely because they have been operating in an abnormally low interest rate environment for many years. For instance, how is a bank to calculate the impact of a rate change on non-maturing deposits, if the interest rate has not changed for the past 10 years? If they run a correlation with interest rates that have been essentially static, they are bound to get poor results. They might go back and look at what happened ten years earlier but this will not reflect current clients, channels and behaviors. In particular, it is very tricky trying to understand customer behaviors with traditional techniques. In many cases, a bank will simply be unable to run sophisticated models with the data it has.

In the absence of adequate quantitative data, IRRBB compliance officers will need to rely on even greater collaboration with the business for the systematic provision of qualitative information and on testing out various assumptions. This goes to the heart of Principle 5: demonstrating to the bank's management that they are dealing with uncertainty. Uncertainty must be taken into account when taking strategic decisions or designing structural hedges. In this respect IRRBB should provide insights that will help management to make better decisions.

In fact, our poll revealed that 92% of the audience regarded IRRBB as an investment opportunity to improve internal systems, with 40% mentioning stress testing, 38% revamping ALM systems and 22% mentioning integration of the IRRBB compliance platform with Basel III liquidity coverage ratio and net stable funding ratio.

As we have seen with new regulations in the past, having accepted that IRRBB compliance is a requirement, banks will use it as an opportunity to get more data into their systems and to improve their modeling. While the impact of IRRBB varies according to the type of bank and the country or countries in which a bank operates, this is the common point for them all.

After all, ALM is not just about IRRBB. There is an overlap with other balance sheet management topics, including liquidity risk, FX risk, liquidity coverage ratio forecasts, funds transfer pricing, and IFRS 9. To generate consistent results across the bank, it is therefore imperative that banks have a single source of data. Top management wants to be able to report across all areas and all types of risk using standard reports. IRRBB provides the opportunity to move towards this unitary risk framework. Behavioral assumptions should be consistent for all risks, and they require long time series with more reporting dimensions. Hence there is a need to increase data granularity and to industrialize data management with a single source of data.

Different Modeling Approaches

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

Both the economic value and earnings-based measures of IRRBB are impacted by many assumptions made for risk quantification. These assumptions include:

- » Expectations for the exercise of both explicit and embedded interest rate options by both the bank and its customers under specific interest rate shock and stress scenarios
- » The treatment of balances and interest flows arising from non-maturity deposits (NMDs)

- » Treatment of the bank's own equity in economic value measures
- » The implications of accounting practices for IRRBB and impact of modeling on the bank's balance sheet

Assessing its IRRBB exposures, a bank must make judgments and assumptions about how an instrument's actual maturity or repricing behavior might diverge from the instrument's contractual terms because of behavioral options.

A major challenge in applying such judgments and assumptions is that some of the modeling techniques are entirely new to some banks. For example, many banks have focused mainly on EVE and much less so on NII, which means that they were not taking into account non-maturity deposit modeling as defined in the IRRBB framework. Banks now must build the appropriate models. To get there they first must ask difficult questions such as, "How do we define core components of a non-maturity deposit?", "How do we define the volatile part?", "What data do we need?" and "How do we aggregate our non-maturity deposits?" Banks lack both the historical and transactional data required to segment the different non-maturity deposits to perform appropriate modeling for the different types.

Generally speaking, a bank's information for ALM purposes is at an aggregated, non-granular level. Aggregated data is unfit for IRRBB modeling, where banks must analyze more dimensions, more precisely for diverse accounts such as fixed rate loans subject to prepayment risk, term deposits subject to early redemption risk, and NMDs. Choosing the right dimensions to provide this granularity will be key to building detailed and accurate models.

A bank might build a model, but then encounter an obstacle in that the model cannot be applied because the data required is incomplete or not yet organized and catalogued. The bank might need to make a trade-off by redefining the model based on the currently available data. In practical terms, the project team might need to use the data that is available now, and over the objections of the quality team, which wants to build the best possible model for future use.

Defining new business assumptions to perform dynamic simulation is challenging, especially for banks that are currently measuring EVE but not NII. Generally, the bank's financial planners will provide input, but their input might be at different levels of granularity from the model dimensions, and making the link will not always be easy.

The top five in-house IRRBB standard behavior models built by banks, according to the webinar poll, are run-off of maturing deposits (44%), prepayment on fixed-rate loans (33%), early redemption on term deposits (15%), facility usage (6%), and credit card usage and behavior (2%).

Governance and Managerial Issues

ALM has been a well-known topic in banks, so many practices are already well covered, but the IRRBB regulators are asking for more documentation and standardized processes. Governance that is managed mainly in Excel or small systems, is no longer acceptable. Governance must focus more strongly on:

- » Model risk management
- » The limit framework
- » Definition of roles and responsibilities – the right roles for the right people

The burdens of different modeling approaches are considerably lightened if the bank integrates all the considerations on modeling within a consistent group-wide framework based on best practice.

To summarize, IRRBB presents an excellent opportunity to put in place the data, modeling, and governance framework that enables the sharing of reports between different teams in the bank. Top management must grasp this opportunity with both hands.

Some Final Considerations

Negative Interest Rate Scenarios

With interest rates in many jurisdictions lingering at historic lows, modeling negative interest rate scenarios has become a new and difficult challenge for many in the ALM community. Many banks have floored their rates at zero for their internal models but the regulators are nevertheless interested in what would happen given negative rate scenarios. If interest rates went to -1%, would you have a negative customer rate in this stressful scenario, or would that customer rate be floored to zero or floored to some positive margin? Much would depend on the contract with each customer, but it introduces a floor in the product. The net interest margin would be rate-dependent, and the margin on the product would have an impact on EVE. Different banks will choose to model this scenario at the portfolio level or the granular level. Banks with 30 years of fixed-rate mortgages will likely choose to model at the granular level; and banks in regions where floating-rate mortgages are the norm will likely model at the portfolio level.

The IRRBB Metrics

It is important to understand that it is variation in EVE and NII that must be measured, not the absolute values. Δ EVE and Δ NII are useful new metrics for risk management. Many banks are still relying on gap and duration measurement, but these metrics are becoming obsolete, useful only for measuring parallel shocks. We are now dealing with distortion along the curve in prescribed scenarios, so having both types of metrics will prove to be a benefit more than a burden. There are plenty of tools in the risk manager's toolbox from basic gap analysis to more sophisticated tools such as value at risk, and earnings at risk through Monte Carlo simulations. However, many in the industry take the view that nowadays you cannot escape modeling through cash flows with validation models for automatic options.

Adjusting the sophistication when modeling cash flows through flexibility makes sense on at least on two levels. First, you can reduce the volume and the calibration of the models by aggregating, for example, loans and non-maturing deposits with similar characteristics, and you can aggregate cash flow generation at the compact level. Computer power in terms of volume and performance is no longer a barrier to such analyses. Second, once you are comfortable with your models, you can use dynamic simulations, starting small before modeling new business hypotheses based on a constant balance sheet, and then enriching the model to test sensitivity to changing interest rates.

Trend towards Dynamic Simulations

Most banks assess interest rate risk based on recent financial results and a constant balance sheet, but such static measures are not terribly useful in evaluating alternative interest rate risk management strategies, because a particular strategy cannot be evaluated until it has been implemented, by which time it is

too late to try others. Dynamic techniques use a simulation model to evaluate the potential impact of a strategy before it has been implemented, providing an opportunity to assess the trade-off between different strategies. Such dynamic simulation is not yet common practice across the industry but is a growing trend, possibly with convergence around counterparty credit risk (CCR) standards. It is a powerful model for businesses that want to integrate capital planning, CCR, budgeting, and IRRBB. It is not an easy step to take because of the data gathering issue, so no bank is going to do it overnight. However, it is necessary to head in that direction to get better insights into how to manage difficult scenarios, such as what happens if they run off non-maturing deposits under a hard shock. Rather than sticking to a static view limited to one year, you could have a run-off model with different levels to show the managers the tactical risk with one funds transfer price and the structural risk with all the variability and trade-offs.

Dynamic simulations rely on making detailed assumptions, for example, regarding changes in existing business lines, new business, and changes in customer behavior. It might not be fully understood within the bank outside specialist ALM functions. So you need to prepare your bank's culture to ease it into dynamic modeling. In the initial phase, this will involve testing some assumptions and presenting the results with the appropriate caveats so that a particular outcome is not taken at face value.

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