

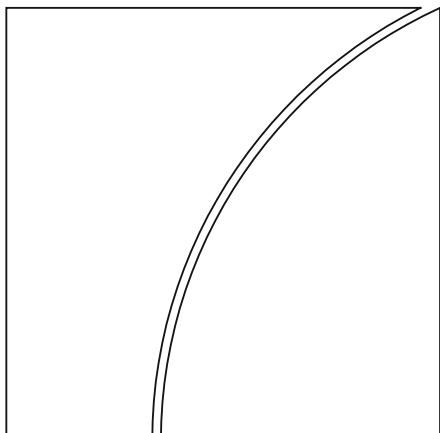
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of Banks of the Americas

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Treatment of interest  
rate risk in the banking  
book in Latin America

Potential impact in Association of Supervisors of Banks  
of the Americas (ASBA) member countries



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## Executive summary<sup>1</sup>

Interest rate risk in the banking book (IRRBB) is a bank's exposure to adverse movements in interest rates and the associated risk to its capital and earnings. Fluctuations in interest rates affect the time path and the present value of future cash flows. In response the economic value of a bank's assets and liabilities change. This risk is inherent to the banking business. However, high levels of exposure to IRRBB can pose a significant threat to a bank's viability. It is therefore important to establish sound supervisory assessments and, potentially, capital requirements for this type of risk.

The Basel Committee on Banking Supervision updated its 2004 interest rate risk principles<sup>2</sup> in April 2016<sup>3</sup> following a consultation<sup>4</sup> in 2015. The final standards continue to be captured in Pillar 2 by an "enhanced Pillar 2 approach", which includes elements of Pillar 3 and a strong presumption for capital consequences for banks with undue risk relative to capital or earnings, possibly under a supervisory mandated standardised approach based on the change in economic value of equity.

This paper provides a qualitative discussion of the current supervisory treatment of IRRBB in Latin America based on a survey covering the main aspects of the new Basel capital framework: (i) IRRBB capital requirements; (ii) choices in assessing and measuring IRRBB; and (iii) reporting, disclosure and supervisory actions. The preliminary results of this survey was presented and discussed with representatives from ASBA jurisdictions at a FSI-ASBA Policy and Implementation Meeting in early 2016

Based on the responses of 17 out of 36 Association of Supervisors of Banks of the Americas (ASBA) member jurisdictions, the following observations can be made on the potential impact of IRRBB implementation in the Americas and related challenges:

- Current practices vary among banks and supervisors.
- It is important to identify the most prevalent forms of IRRBB (gap, yield curve, option and basis risk), to best measure and manage this risk.
- The treatment of non-maturity deposits is highly relevant, due to a strong influence on the outcome depending on the modelling assumptions adopted.
- Knowing redemption and prepayment rates is important for understanding how banks manage IRRBB.
- Interest rate optionality and basis risk should be assessed, due to uncertainty about the cash flows associated with both.
- It is fundamental to assess the time horizon properly for the earnings-based measure.
- Economic value of equity (EVE) and net interest income (NII) are the relevant risk measures for managing IRRBB and performing the related capital adequacy assessment.

Proper implementation of IRRBB will bring additional challenges for supervisors in their day-to-day supervision. The enhanced Pillar 2 framework must be implemented by 2018. We consider this an

<sup>1</sup> The authors thank the reviewers for their valuable comments and suggestions, which helped improve the design of the survey and the development of the paper: Juan Carlos Crisanto, Jeff Miller, Jermy Prenio, Roland Raskopf and Raihan Zamil from the Financial Stability Institute, and André Mauricio Trindade da Rocha, Douglas Kiarely Godoy de Araujo, Joao Andre Calvino Marques Pereira, Julio Cesar Moreira Salvador, Luis Eduardo Novaes de Miranda and Roberto Nygaard from the Central Bank of Brazil.

<sup>2</sup> Basel Committee on Banking Supervision, *Principles for the management and supervision of interest rate risk*, July 2004.

<sup>3</sup> Basel Committee on Banking Supervision, *Interest rate risk in the banking book: standards*, April 2016.

<sup>4</sup> Basel Committee on Banking Supervision, *Interest rate risk in the banking book: consultative document*, June 2015.

opportunity for jurisdictions to discuss, establish and improve the supervisory treatment of IRRBB, mainly focusing on the:

- requirements for reporting to supervisors and disclosure to stakeholders;
- regular on- and off-site procedures; and
- capital and non-capital remedial actions, in particular by clearly defining an outlier test to guide the IRRBB capital adequacy assessment.

## 1. Introduction

Interest rate risk (IRR) for banks resides in two supervisory books. For short-term positions in the trading book, fluctuations in market value due to interest rate movements immediately affect earnings and regulatory capital through fair value in the profit and loss account. For longer term banking book (BB) positions, fluctuations in interest rates also affect the time path and present value of future cash flows and hence banks' capital and earnings. Changes in cash flows due to interest rate movements affect earnings, although fluctuations in market value due to interest rate movements in general do not immediately affect earnings, except for certain accounting items (fair value option). The BB form of interest rate risk is likely to be relevant in most jurisdictions in the Americas.

In 2004, the Basel Committee on Banking Supervision (BCBS) issued the *Principles for the management and supervision of interest rate risk* (IRR Principles),<sup>5</sup> defining: (i) the standardised shocked scenarios – 200 basis points or the 1st and 99th percentiles of the observed interest rate changes; and (ii) an outlier test – for identifying banks with material IRRBB exposures, focusing on an economic value metric, when this metric declines more than 20% of the sum of Tier 1 and Tier 2 capital.

A consultative document was issued by the BCBS in 2015 proposing changes for the treatment of IRRBB:<sup>6</sup> (i) to help ensure that banks have appropriate capital to cover potential losses from exposures to changes in interest rates; and (ii) to limit incentives for capital arbitrage between the trading and banking books. In the discussion, there were two options for the treatment of IRRBB: (i) a standardised Pillar 1 minimum capital requirement, with both economic value and earnings-based measures; and (ii) an enhanced Pillar 2 approach, which also includes elements of Pillar 3 – Market Discipline.

Given the heterogeneous nature of IRRBB, the BCBS agreed to continue capturing this risk in an enhanced Pillar 2 framework. Under the new framework,<sup>7</sup> banks will be able to use their internal measurement systems (IMS) to assess their capital adequacy, based on the change in both economic value of equity (EVE) and net interest income (NII), computed according to a set of prescribed interest rate shock scenarios. Nonetheless, supervisors could mandate their banks to follow, or a bank could choose to adopt the standardised framework, which is solely based on the EVE change. Also, supervisors must publish their criteria for identifying outlier banks, including at least one that compares the change in EVE with 15% of banks' Tier 1 capital.

To identify and discuss relevant implementation issues for banks in the Americas, we designed a survey on IRRBB practices with a mix of 20 closed and open (qualitative) questions. The questionnaire is divided into three parts that cover the mains aspects of the revised BCBS framework: (i) IRRBB capital requirements; (ii) choices in assessing and measuring IRRBB; and (iii) reporting, disclosure and supervisory actions. Seventeen out of 36 ASBA jurisdictions answered the survey: Argentina, Bolivia, Brazil, Chile, the

<sup>5</sup> Basel Committee on Banking Supervision, *Principles for the management and supervision of interest rate risk*, July 2004.

<sup>6</sup> Basel Committee on Banking Supervision, *Interest rate risk in the banking book: consultative document*, June 2015.

<sup>7</sup> Basel Committee on Banking Supervision, *Interest rate risk in the banking book: standards*, April 2016.

Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Spain, Trinidad and Tobago, and Uruguay. Of course, the results cannot be generalised to all ASBA members.

Based on the analysis of responses to the survey, the following remarks highlight the potential impact of IRRBB implementation in the Americas and related challenges:

- Current practices vary among banks and supervisors.
- It is important to identify the most prevalent forms of IRRBB (gap, yield curve, option and basis risk), to best measure and manage this risk.
- The treatment of non-maturity deposits (NMDs) is highly relevant, due to a strong influence on the outcome depending on the modelling assumptions adopted.
- Knowing redemption and prepayment rates is important for understanding how banks manage IRRBB.
- Interest rate optionality and basis risk should be assessed, due to uncertainty about the cash flows associated with both.
- It is fundamental to assess the time horizon properly for the earnings-based measure.
- Economic value of equity (EVE) and net interest income (NII) are the relevant risk measures for managing IRRBB and performing the related capital adequacy assessment.

The IRRBB implementation of the enhanced Pillar 2 framework will offer opportunities for supervisors to improve their IRRBB supervisory practices, including in day-to-day supervision. Thus, it is important to discuss, establish and improve, as early as possible, the:

- requirements for reporting to supervisors and disclosure to stakeholders;
- regular on- and off-site procedures; and
- capital and non-capital remedial actions, in particular by clearly defining the outlier test to guide the IRRBB capital adequacy assessment.

The paper is structured as follows: Section 2 presents the background of the IRRBB definitions, measures and the Basel framework. Section 3 describes the survey design. Section 4 discusses the survey results, and Section 5 concludes, underlining the potential effects of IRRBB in ASBA member countries.

## 2. Definitions, measures and the Basel framework for IRRBB

### 2.1 Components of interest rate risk

According to the literature,<sup>8</sup> there are four main types of interest rate risk that can potentially change the economic value and earnings of interest rate-sensitive positions and adversely affect a bank's financial condition:

- **Gap risk:** refers to the term structure of banking book instruments (Graph 1) as the resets on different instruments occur at different tenors. Gap risk arises when the rate of interest paid on liabilities increases before the rate of interest received on assets (or the rate received on assets decreases before the rate paid on liabilities). For instance, assuming a scenario of increasing

<sup>8</sup> Basel Committee on Banking Supervision, *Interest rate risk in the banking book: consultative document*, June 2015, pp 7–8.

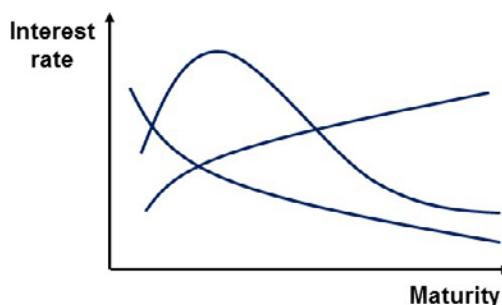
interest rates, a bank that has a long fixed rate loan and a short floating rate deposit will experience a negative interest margin.

- **Yield curve risk:** refers to the relative difference in interest rates at different tenors, considering that interest rate changes at different horizons are not perfectly correlated. This non-parallel gap or yield curve risk arises from changes in the slope and the shape of the yield curve. Graph 1 shows a few possible shapes of the term structure of interest rates.<sup>9</sup>

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Possible shapes of term structures of interest rates

Graph 1



- **Optionality risk:** refers to the risk of non-linear price movements in instruments to changes in interest rates. There are two types of option risk: automatic and behavioural.

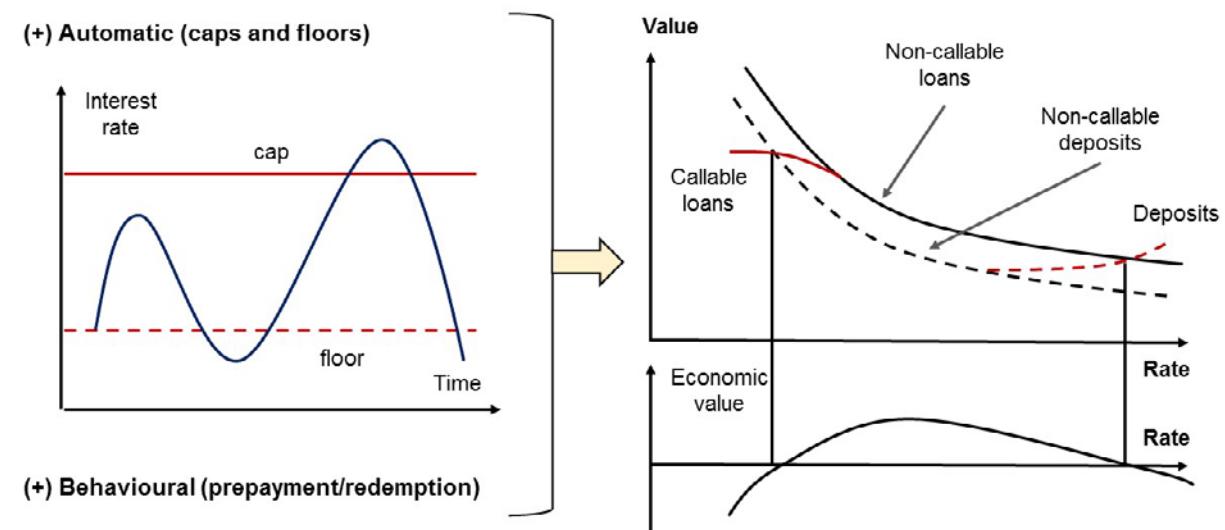
Automatic options typically do not depend on actions from the customer, like exchange-traded and over-the-counter options and embedded caps and floors (eg floating rate mortgages with a cap and certificate of deposits with a floor or a cap).

Behavioural options are not known in advance as they depend on the behaviour of an individual client. On the asset side, for example, there are fixed rate loans with prepayment risk. If interest rates decrease, then clients have an economic incentive to refinance, ie prepay the loan (prepayment risk). Prepayments are typically higher (lower) during periods of falling (rising) interest rates. On the liability side, there are certain term deposits which permit early withdrawal of the outstanding balance. If interest rates increase, then clients have an economic incentive to reinvest, ie withdraw earlier (withdrawal risk). Redemptions are typically higher (lower) during periods of rising (falling) interest rates.

Both automatic (caps and floors) and behavioural (prepayment/redemption) options can cause the "scissors effect" in the economic value of financial instruments,<sup>10</sup> when revenues and costs move in diverging directions, as shown in Graph 2.

<sup>9</sup> See J Bessis, *Risk management in Banking*, 4th ed, Wiley, 2015, p 105.

<sup>10</sup> See Bessis, *ibid*, p 130 and p 170.



Source: J Bessis, *Risk management in Banking*, 4th ed, Wiley, 2015, p 130 and p 170.

- **Basis risk:** refers to various dislocations between two or more different reference rate curves within or across currencies as well as different tenors for the same reference rate curve. Transaction accounts can be viewed as an example of basis risk, as they pay different rates on different tenors.<sup>11</sup> Given that actual interest rates may move differently for both the implied cost of funds and the product rate, the bank can face a margin shortfall due to the basis risk.
- In addition, credit spreads on interest rates have a major impact on the value and related earnings/costs of financial instruments.

## 2.2 Economic value and earnings-based measures

Interest rate risk has two main forms: economic value volatility and earnings volatility. Measuring both risks is necessary to understand the full scope of IRRBB.<sup>12</sup>

Economic value (EV) or the economic value of equity (EVE) is defined as the present value of assets minus the present value of liabilities plus off-balance sheet items, which measures the change in the market value of equity resulting from fluctuations in interest rates. The market value of equity in interest rate shock scenarios is typically compared with the market value of equity under a base scenario.<sup>13</sup>

EVE measures capture the long-term effect of interest rate changes, which is a key aspect of banks' choosing a business and risk management strategy while keeping an adequate level of capitalisation in the long term. However, EVE may provide insufficient information on possible inadequate capitalisation in the short run, when extreme temporary shocks could cause large losses.<sup>14</sup>

<sup>11</sup> See Australian Prudential Regulation Authority, *Prudential practice guide APG 117 – interest rate risk in the banking book (Advanced ADIs)*, January 2008, pp 8–9.

<sup>12</sup> See European Banking Authority, *Final report: guidelines on the management of interest rate risk arising from non-trading activities*, May 2015, p 15.

<sup>13</sup> See Basel Committee on Banking Supervision, *Range of practices and issues in economic capital frameworks*, March 2009, p 54.

<sup>14</sup> See European Banking Authority, op cit, p 15.

Conversely, earnings at risk (EaR), or net interest income (NII), is defined as the short-term sensitivity of earnings to interest rate movements. Earnings-based measures capture the short-term effect of interest rate changes on the earnings of a bank and therefore, indirectly through profitability, reveal the short-term solvency effect. NII is suitable for measuring the effect on near-term earnings of changes in interest rates that potentially have a substantial effect in the short term, such as significant steepening or flattening of the yield curve.<sup>15</sup>

Supervisors (and banks) in general need to strike a balance between earnings stability and the optimal duration of equity. Banks tend to use NII more frequently for managing IRRBB, whereas supervisors like the comparability and capital adequacy of EVE, but often promote the use of both for IRRBB management. Depending on the focus, different aspects matter more. In most cases, for example, if earnings volatility is mitigated (eg by investing in more long-term fixed rate assets), economic value becomes more vulnerable, and vice versa.

The main difference between EVE and NII can be seen in two aspects:

- **Outcomes:** EVE shows the economic changes to equity and NII the changes to future profitability.
- **Time horizon:** EVE considers the remaining life of the balance sheet in a static view (until all positions have run off, ie the run-off view) whereas NII focuses on the short to medium term (ie does not capture risks beyond the period of estimation)<sup>16</sup>. This typically assumes rollover of maturing positions and potentially applying a dynamic view of future business opportunities.

However, EVE and NII have the following similarities: (i) both reflect the impact of variation in cash flows arising from changes in interest rates; (ii) the change in expected earnings is reflected in the change in economic value; and (iii) both are affected by common important assumptions for IRRBB management, like the range of interest rate shocks, interest rate flows arising from NMDs, and the exercise of options for both automatic and behavioural options.

Banks primarily use an earnings-based metric to measure and manage interest rate risk. EVE metrics consider positions currently on the balance sheet whereas in computing NII banks can use models to predict the path of rates and the run-off of existing assets and liabilities, from constant balance sheet models to complex dynamic models reflecting estimated changes in the volumes and types of a bank's business. On the other hand, regulators focussing on bank's solvency have tended to endorse EVE acknowledging the longer term impact on capital. For instance, Nygaard shows, based on a hypothetical and simple example, that EVE is suggested as a better approach for evaluating capital requirements<sup>17</sup>. In its 2015 consultative paper, the BCBS proposed measures that integrate both EVE and earnings.

## 2.3 The standardised framework for IRRBB

The 2015 consultative document presented two options for the capital treatment of IRRBB: (i) a Pillar 1 approach for computing the minimum capital requirements, with both economic value and earnings-based measures, based on four options: from a pure delta EVE measure to three different combinations between the delta EVE and delta NII; and (ii) an enhanced Pillar 2 approach, under which banks would be allowed to use their internal measurement systems for assessing their capital adequacy subject to supervisory review, including quantitative disclosure and the fallback standardised approach.

<sup>15</sup> See European Banking Authority, *ibid*, p 15.

<sup>16</sup> The BCBS defined, in the Revised IRR Principle 8, that the delta NII should be disclosed as the difference in future interest income over a rolling 12-month period. See Basel Committee on Banking Supervision, *op cit*, April 2016, p 14.

<sup>17</sup> See R Nygaard, "Interest rate risk in the banking book and capital requirement – issues on EVE and EaR", *Journal of the Banking Supervisor*, no 37, February–April 2014.

According to the BCBS, most jurisdictions employ a Pillar 2 approach based on EVE. Currently, two BCBS member jurisdictions adopt a Pillar 1 approach: Australia, which implemented only the EVE measure for IRRBB,<sup>18</sup> and Mexico, where regulations do not distinguish between trading and banking books.<sup>19</sup>

In its final document on the treatment of IRRBB in 2016, the BCBS took into account "the industry's feedback on the feasibility of a Pillar 1 approach to IRRBB, in particular the complexities involved in formulating a standardised measure of IRRBB which would be both sufficiently accurate and risk-sensitive to allow it to act as a means of setting regulatory capital requirements". This led to the conclusion that the heterogeneous nature of IRRBB would be more properly captured in an enhanced Pillar 2 approach. Under the new framework, banks will be able to use their internal measurement systems (IMS) to assess their capital adequacy in Pillar 2 based on both EVE and NII. The computation must use a set of prescribed interest rate shock scenarios. Also, supervisors can mandate their banks to follow the standardised approach for measuring IRRBB. Alternatively, banks may choose to adopt the standardised framework, which is solely based on EVE. Supervisors are required to publish their criteria for identifying outlier banks, at a minimum when EVE changes with more than 15% of a bank's Tier 1 capital.

Based on the BCBS criteria of risk sensitivity, simplicity and comparability as well as a more limited reliance on banks' internal assessments the main features of the standardised framework can be summarised as follows:<sup>20</sup>

- The measure for computing minimum capital requirements is solely based on an EVE approach.
- All future notional repricing cash flows of interest rate sensitive assets, liabilities and off-balance sheet positions are projected into a series of 19 predefined time buckets.
- For products identified as not being amenable to standardisation (ie automatic interest rate options, NMDs, fixed rate loans with prepayments, term deposits with early redemption risk and fixed rate loan commitments or pipelines), banks may be allowed to use their internal estimates, sometimes with constraints and fallbacks for slotting positions, subject to supervisory approval.
- The baseline approach specifies six interest rate shock scenarios (including upward/downward parallel shifts, steepening, flattening, and short rates up and down), subject to defined caps and floors.

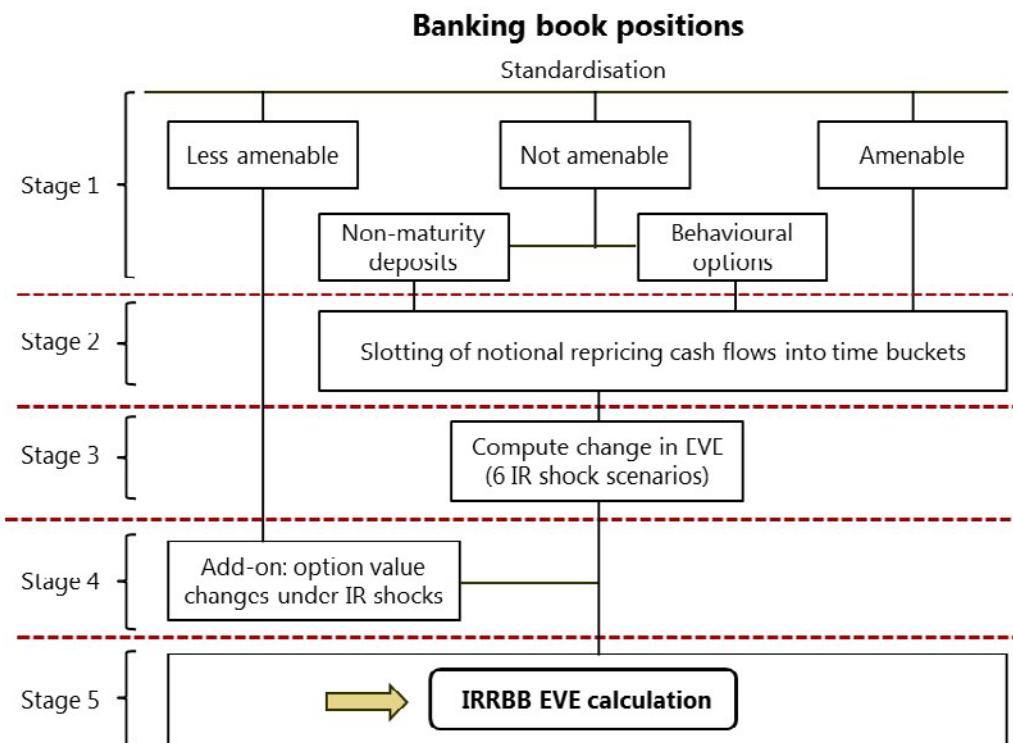
The five stages of the standardised framework for EVE as defined by the BCBS<sup>21</sup> are summarised in Graph 3.

<sup>18</sup> See Australian Prudential Regulation Authority, *Prudential standard APS 117 – capital adequacy: interest rate risk in the banking book (advanced ADIs)*, January 2013.

<sup>19</sup> See Basel Committee on Banking Supervision, *Regulatory Consistency Assessment Programme (RCAP): Assessment of Basel III risk-based capital regulations – Mexico*, March 2015, p 27.

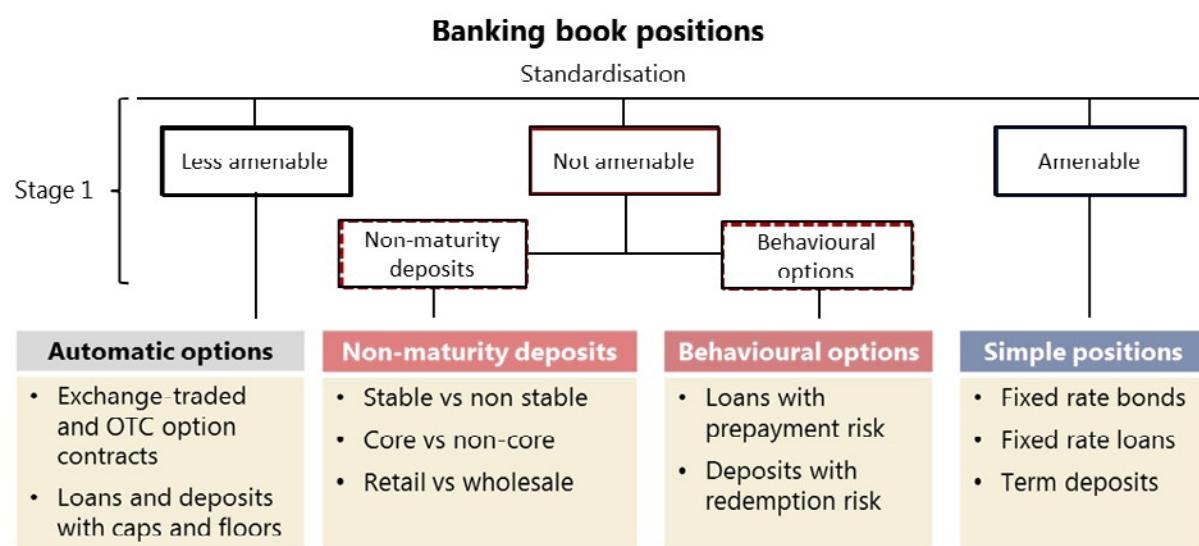
<sup>20</sup> See Basel Committee on Banking Supervision, *Basel III monitoring report: comprehensive QIS on interest rate risk in the banking book*, March 2016, pp 31–2.

<sup>21</sup> See Basel Committee on Banking Supervision, op cit, April 2016, pp 22–31.



- Stage 1:** positions are classified as amenable, less amenable or not amenable to standardisation (Graph 4).

Classification of positions as amenable, less amenable or not amenable to standardisation



- **Stage 2:** notional cash flows (CF) are slotted into 19 prescribed time buckets, from overnight to 20 years and above (Graph 5).

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Slotting of notional cash flows into prescribed time buckets

Graph 5

Stage 2		Slotting of notional repricing cash flows into time buckets							
		Time bucket intervals (M: months; Y: years)							
Short-term rates	Overnight	0/N < $t^{CF}$ $\leq$ 1M	1M < $t^{CF}$ $\leq$ 3M	3M < $t^{CF}$ $\leq$ 6M	6M < $t^{CF}$ $\leq$ 9M	9M < $t^{CF}$ $\leq$ 1Y	1Y < $t^{CF}$ $\leq$ 1.5Y	1.5Y < $t^{CF}$ $\leq$ 2Y	
Medium-term rates	2Y < $t^{CF}$ $\leq$ 3Y	3Y < $t^{CF}$ $\leq$ 4Y	4Y < $t^{CF}$ $\leq$ 5Y	5Y < $t^{CF}$ $\leq$ 6Y	6Y < $t^{CF}$ $\leq$ 7Y				
Long-term rates	7Y < $t^{CF}$ $\leq$ 8Y	8Y < $t^{CF}$ $\leq$ 9Y	9Y < $t^{CF}$ $\leq$ 10Y	10Y < $t^{CF}$ $\leq$ 15Y	15Y < $t^{CF}$ $\leq$ 20Y	$t^{CF} > 20Y$			

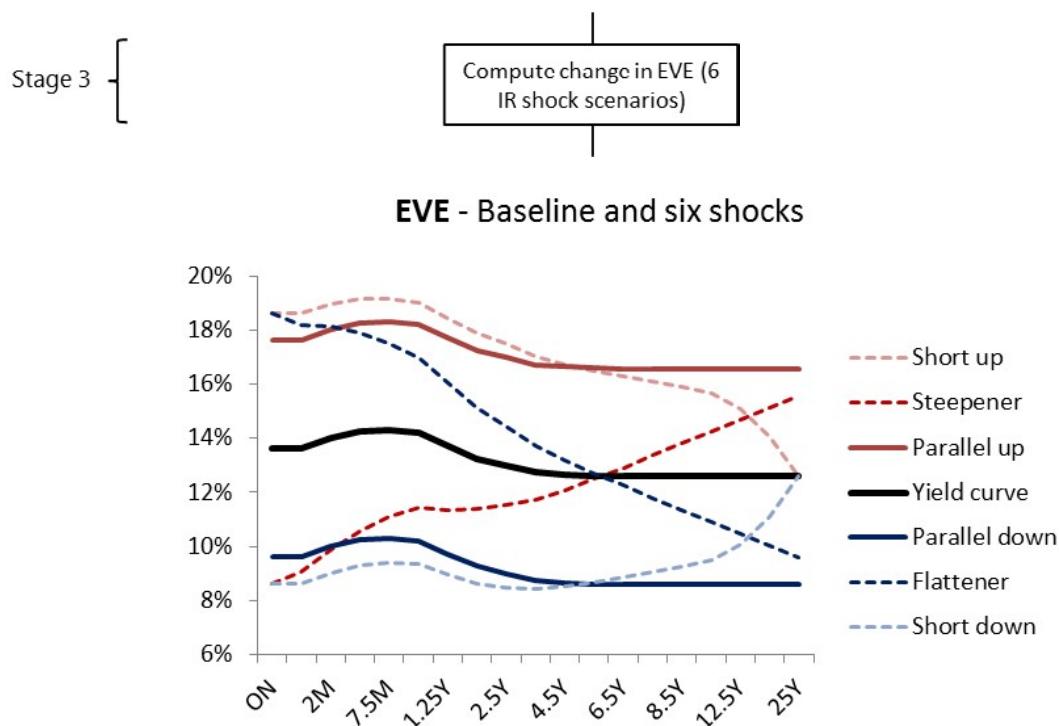
The cash flow allocation of non-amenable positions can differ significantly from bank to bank depending on the set of assumptions and calibration of parameters, for instance in terms of: (i) the definition of the stable part (core) of NMDs; (ii) the estimation of the term deposit redemption rate (TDRR) for deposits subject to redemption risk; and (iii) the estimation of the conditional prepayment rate (CPR) for loans subject to prepayment risk. This, of course, affects the outcome of IRRBB capital requirements.

- **Stage 3:** changes in EVE, or  $\Delta$ EVE, are calculated per currency for all six prescribed interest rate shock scenarios (Graph 6).

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Example of shocks computed for the Brazilian interest rate term structure, as of 30 June of 2015<sup>1</sup>

Graph 6



<sup>1</sup> According to the methodology described in Annex 1 of BCBS, *Interest rate risk in the banking book*, June 2015, p 56–8.

- **Stage 4:** changes in the value of automatic options are added to the changes in EVE, based on: (i) each of the six interest rate shock scenarios; and (ii) a relative increase in the implicit volatility of 25%.
- **Stage 5:** the EVE calculation under the standardised framework is the maximum of potential EVE losses of the six supervisory prescribed interest rate shocks.

After completing the five stages and computing the changes in EVE (ie the EVE computed with the current interest rate levels minus the EVE computed based on each stressed scenario), the following questions for supervisors are critical in finding the adequate level of capital for IRRBB. Is the change in the EVE figure significant? What is the proper level of capital adequacy with regard to IRRBB? Does the outcome match supervisory expectations? The revised IRR Principles offer excellent support and guidance for supervisors to find reasonable and balanced responses to these important questions.

## 2.4 The revised IRR Principles

In comparison to the 2004 document, the revised Principles offer an update of various principles and include a methodology for assessing the capital adequacy and guidance for supervisory responses with a strong presumption for capital consequences for outlier banks. It also updates the appropriate disclosure requirements and includes a well defined peer review process. A substantial part provides greater guidance on supervisory expectations for banks' IRRBB management process with a stronger focus on the development of shock and stress scenarios.

The BCBS set 12 high-level principles for the management of IRRBB. There are nine principles for banks and three for supervisors, as summarised below.

### Principles for banks (1–9):

- Risk management, corporate governance and internal controls (1–3)
- Measurement and assumptions (4–5)
- Measurement systems, models and outcomes (6–7)
- Disclosure (8)
- Capital adequacy assessment (9)

### Principles for supervisors (10–12):

- Monitoring (10)
- Regular assessment (11)
- Review of capital and actions for outlier banks (12)

With regard to the measurement of IRRBB by banks: (i) it should be based on outcomes for both economic value and earnings; (ii) banks will be able to use their IMS to assess their capital adequacy; (iii) IMS are subject to supervisory review and approval; and (iv) the Standardised Approach can work as a fallback or, in our view, for some jurisdictions even act as a benchmark for internal models.

Banks must report to regulators the results and assumptions of their internal models for quantifying IRRBB, for both EVE and NII. If supervisors find that a bank's internal models for computing IRRBB capital requirements under Pillar 2 are not reasonable, the bank must improve its IMS and/or calculate it based on the standardised framework in terms of change in EVE.

In relation to disclosure, banks should mainly make publicly known: (i) IRRBB levels calculated by the IMS or the Standardised Approach (if applied); (ii) key assumptions relating to NMDs, and to other optionality, especially on prepayment and redemption risks; and (iii) qualitative and quantitative assessment of IRRBB levels.

For supervisors, apart from the usual regular assessment and monitoring of IRRBB, there are significant consequences for dealing with outlier banks. The 2004 Principles introduced the concept of outliers, but the new principles ask for more enforcement actions by supervisors, in terms of both capital and non-capital related actions.

Supervisors must publish their criteria for identifying outlier banks and implement at least one outlier/materiality test that compares the bank's maximum change in EVE under the six prescribed interest rate shock scenarios, with 15% of its Tier 1 capital. Supervisors may also implement additional outlier/materiality tests, using different capital measures (eg Common Equity Tier 1) or capturing the bank's IRRBB relative to earnings, since the threshold is at least 15% of Tier 1 capital.

Banks identified as outliers are subject to supervisory review. If a bank's management of IRRBB appears to be inadequate or there is excessive risk relative to capital or earnings, supervisors should require the bank to do one or more of the following: (i) reduce its IRRBB exposure; (ii) allocate additional capital; (iii) set constraints on its internal risk parameters; and/or (iv) improve its risk management framework.

This revised framework for IRRBB should help supervisors and banks to promote greater consistency, transparency and comparability in the measurement and management of IRRBB. The BCBS implementation deadline for the revised standards for IRRBB is 2018.

### 3. Survey design

We designed a survey for the Americas on the current supervisory treatment of IRRBB to identify the most relevant issues for implementation of the new Basel framework. We asked a combination of 20 closed and open (qualitative) questions,<sup>22</sup> divided into three parts that cover: (i) IRRBB capital requirements; (ii) choices in assessing and measuring IRRBB; and (iii) reporting, disclosure and supervisory actions.

#### 3.1 Part 1 – Capital requirements for IRRBB

The first part has six questions about:

- Pillar 1 vs Pillar 2 approaches
- Metrics required by jurisdictions and adopted by industry
- Economic value vs earnings-based measures
- Prescribing standardised interest rate shock scenarios
- Supervisory standards for the management and measurement of IRRBB
- Definitions and standards for credit spread risk in the banking book (CSRBB)

#### 3.2 Part 2 – Choices in assessing and measuring IRRBB

The second part contains nine questions on:

- The prevalent form of IRRBB
- The interest rate curve used for repricing the cash flows
- The relative importance of core non-maturity deposits
- Behavioural options regarding loans subject to prepayment risk and deposits subject to redemption risk (early withdrawal)
- Automatic options
- Basis risk
- The time horizon for measuring IRRBB
- The relevance of positions in foreign currency

#### 3.3 Part 3 – Reporting, disclosure and supervisory actions

The last part consists of five questions covering:

- Reporting to supervisors and public disclosure
- IRRBB risk management objectives and policies, including relevant assumptions for non-maturity deposits, and redemption and prepayment rates
- Regularly conducted on- and off-site assessments
- Capital and non-capital remedial actions

<sup>22</sup> Please see the questions in the Annex.

The survey was submitted by ASBA to all its member countries.

## 4. Analysis of responses

In this section, we present the results and point out some of the most important implementation challenges we see based on the responses of the ASBA members which participated in the survey: Argentina, Bolivia, Brazil, Chile, the Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Spain, Trinidad and Tobago, and Uruguay. Of course, the results cannot be generalised to all ASBA members.

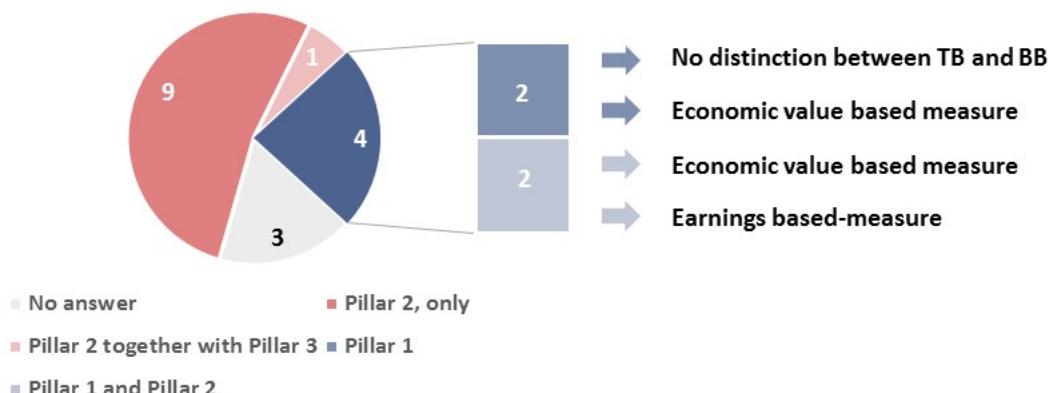
### 4.1 Part 1 – Capital requirements for IRRBB

According to Graph 7, about half (52.9%) of jurisdictions adopt a straight Pillar 2 approach for the purposes of capital requirements for IRRBB. Among the four jurisdictions that use some Pillar 1 approach, two use an economic value measure, and another an earnings-based measure. One jurisdiction does not make a distinction in the prescribed treatment between the trading and banking books.

Pillar 1 vs Pillar 2 approaches and metric established in Pillar 1

Graph 7

**Q.01 - Pillar 1 vs Pillar 2 approaches**      **Q.02 - Metric established in Pillar 1**



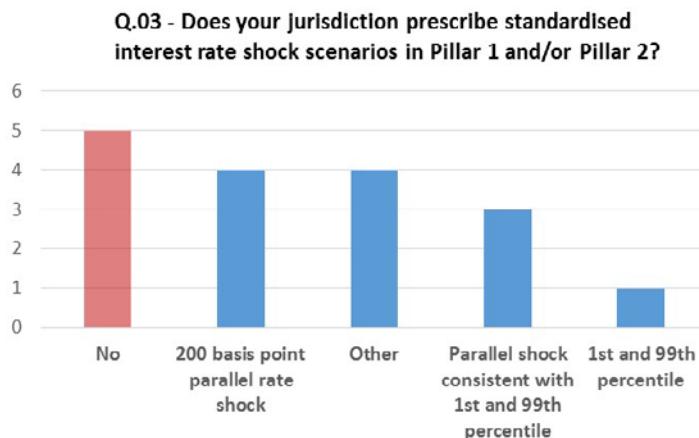
Graph 8 shows that roughly two thirds (12 out of 17) of jurisdictions prescribe any standardised interest rate shock scenarios under Pillar 1 and/or 2. This is similar to the alignment to the 2004 principles for the management and supervision of interest rate risk.

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## Prescribed standardised interest rate shock scenarios

Graph 8

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Graph 9 shows that more than half (58.8%) of the jurisdictions that responded to the survey prescribe supervisory standards or guiding principles for the management and measurement of IRRBB.

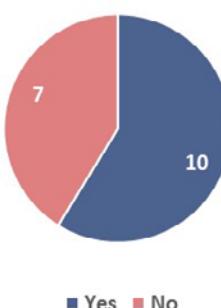
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## Supervisory standards and principles

Graph 9

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**Q.04 - Supervisory standards or guiding principles for the management and measurement of IRRBB?**



However, it should be emphasised that some jurisdictions have implemented only general principles and others a much more detailed approach. We underline below some good practices in terms of standards and guiding principles revealed by the survey, which are in line with the 2004 principles and the new framework:

- Estimation of potential losses under different scenarios
- Prescription of standardised shocks
- Assessment and monitoring of changes in interest income and economic value
- Definition of internal limits
- Comparison between estimated and current measures
- Collection and computation of historical data from main interest rate risk factors

- Corporate governance and management structure for IRRBB

Concerning the metrics most often used by banks for measuring IRRBB: (i) in seven jurisdictions (41.2%), banks use both economic value and earnings; (ii) in five ASBA members (29.4%), banks adopt other measures; and (iii) four jurisdictions (23.5%) do not know the metric most often adopted by banks. In one jurisdiction, banks solely use the economic value based measure (Graph 10).

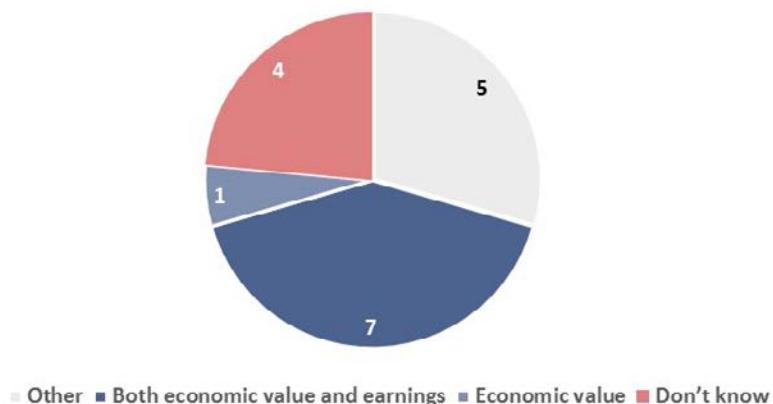
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IRRBB metrics adopted by banks

Graph 10

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**Q.05 - Metric(s) most often used by banks**

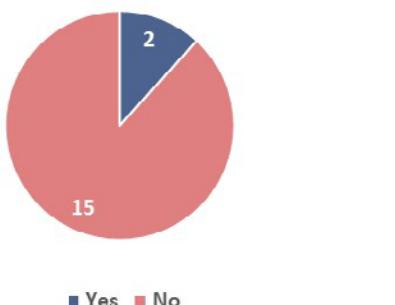


In some jurisdictions, banks have adopted other metrics: (i) volatility in interest rates; (ii) GAP and duration; (iii) stressed scenarios; and (iv) value-at-risk (VaR) with a holding period of three months (which does not seem appropriate for the long-term positions of the banking book). These results reveal that some jurisdictions will need to discuss and improve the way banks are measuring IRRBB.

As shown in Graph 11, only two jurisdictions provided definitions and standards for the treatment of CSRBB. The results obtained in this survey are similar to those of previous studies conducted by the BCBS,<sup>23</sup> and demonstrate the early stage of CSRBB implementation around the globe. This result also provides anecdotal evidence that banks typically manage CSRBB as part of credit risk together with default risk and different from IRRBB.

<sup>23</sup> Basel Committee on Banking Supervision, *ibid.*, June 2015, p.6.

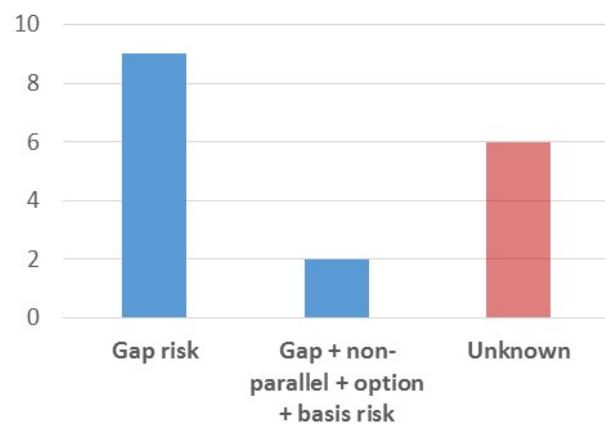
**Q.06 - Supervisory definitions and standards for CSRBB**



## 4.2 Part 2 – Choices in assessing and measuring IRRBB

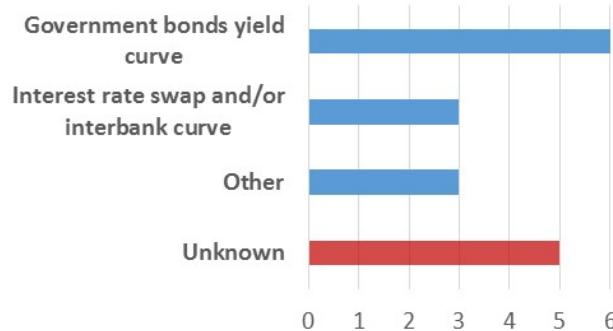
Institutions should identify and measure the main components of IRRBB and choose the most appropriate method to manage this risk. Graph 12 shows that the most prevalent form of IRRBB is gap risk (52.9%), followed by a combination between its main determinants (11.8%). Six jurisdictions (35.3%) do not know the primary source of this type of risk.

**Q.07 - Most prevalent form of IRRBB**



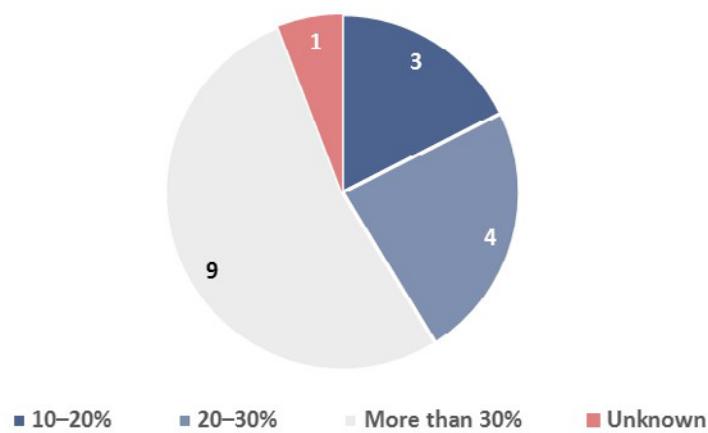
Another basic concept for computing the IRRBB capital requirements is the choice regarding the interest rate curve used for discounting the notional repricing cash flows. In Graph 13, we see that the government bond yield (35.3%) is the most adopted curve, followed by the interest rate swap (17.6%) and other (17.6%) curves. Five jurisdictions (29.4%) do not know how banks are discounting their banking book cash flows.

**Q.08 - Interest rate curve used by the banks for discounting cash flows**



When assessing its interest rate risk exposure, a bank also must make judgments and assumptions about how a financial instrument's actual maturity or repricing behaviour may vary from the instrument's contractual terms. Assumptions are especially important for NMDs,<sup>24</sup> because their behavioural maturity can be modelled as significantly longer and the level of balances can be shown to be relatively insensitive to interest rate changes.<sup>25</sup> Graph 14 shows that nine jurisdictions (52.9%) have NMDs that represent more than 30% of their total liabilities, and four (23.5%) show a range of NMDs between 20–30%. Three jurisdictions (17.6%) show a relative importance of NMDs of 10–20%, and only one does not know the percentage.

**Q.09 - Importance of core NMDs in relation to total liabilities**



<sup>24</sup> See Office of the Comptroller of the Currency, *Interest rate risk: comptroller's handbook, narrative – June 1997, procedures – March 1998*, p 14.

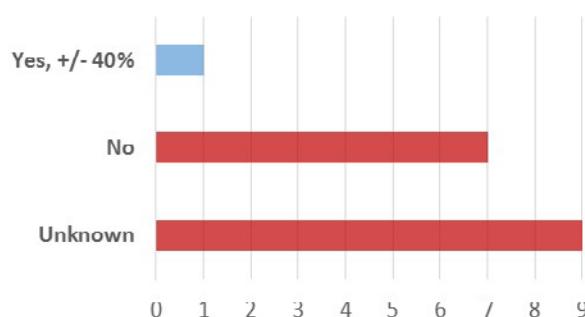
<sup>25</sup> See European Banking Authority, op cit, p 18.

Another challenge in measuring IRRBB is the identification and the incorporation of products or positions where the assumed behavioural repricing date differs significantly from the contractual repricing date, or where there is no stated contractual repricing date.<sup>26</sup> In this regard, the knowledge of redemption and prepayment rates can be a plus in understanding how banks manage IRRBB. Graph 15 reveals that the vast majority of banks (94.1%) do not model or know their normally observed prepayment and redemption rates.

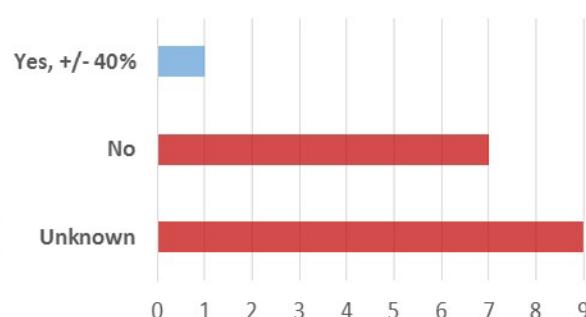
#### Modelling of normally observed prepayment and redemption rates

Graph 15

**Q10 - Modelling of normally observed prepayment rates in fixed rate loans**



**Q11 - Modelling of normally observed redemption rates for term deposits**

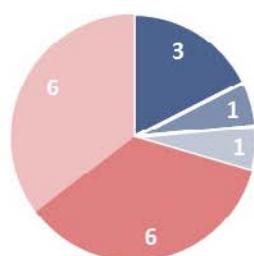


Likewise, basis risk and automatic options should also be assessed by the banking industry and supervisors, due to the uncertainty about cash flows associated with both concepts. According to Graph 16, most jurisdictions' banks do not incorporate or know how the measurement of basis risk (70.6%) and interest rate automatic options (76.5%) are typically incorporated into the IRRBB metric.

#### Measurement of basis and option risk

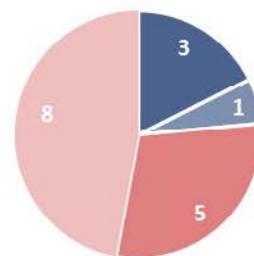
Graph 16

**Q.12 - Measurement of basis risk**



- Incorporated in EVE and earnings
- Incorporated in VaR
- Incorporated in EVE
- Not incorporated
- Unknown

**Q.13 - Measurement of automatic options**



- Incorporated in EVE and earnings
- Incorporated in other measure
- Not incorporated
- Unknown

<sup>26</sup> See European Banking Authority, op cit, p 10.

Closing this part of the survey are two questions covering the time horizon used for measuring IRRBB and the relative importance of foreign exchange (FX) positions. As Graph 17 shows, about two thirds (64.7%) of jurisdictions use one year or less to measure IRRBB, one country adopts a time horizon of more than four years, and five countries (29.4%) do not know what time horizon they use. These results could lead to a discussion about the use of a short time horizon for the earnings-based measure vs the economic value.

Regarding FX positions in relation to total exposure, there are similar distributions for the ranges 5–10% (three jurisdictions), 10–20% (four countries) and more than 30% (three jurisdictions). Six jurisdictions do not know the relative importance of FX exposure to IRRBB.

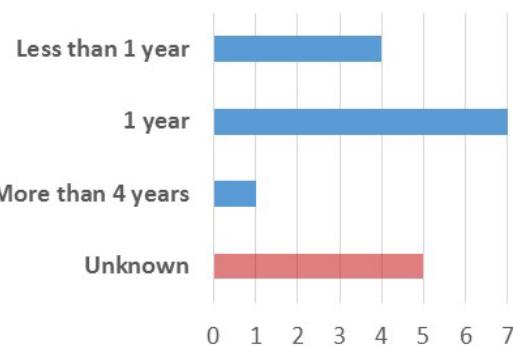
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Time horizon for measuring IRRBB and importance of FX positions

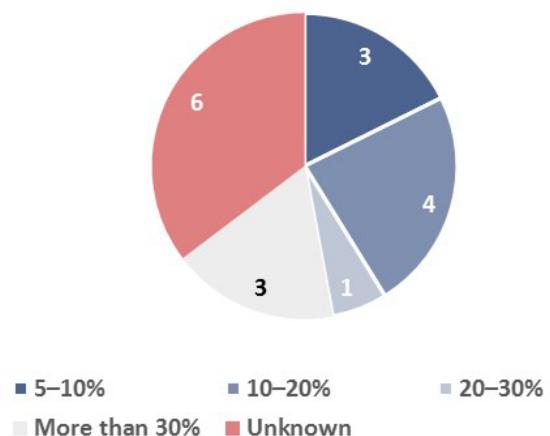
Graph 17

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**Q14 - Time horizon used for measuring IRRBB**



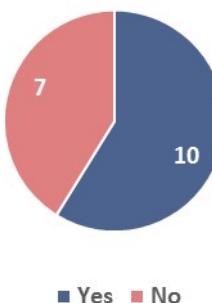
**Q.15 - Importance of positions in FX in relation to total exposure**



#### 4.3 Part 3 – Reporting, disclosure and supervisory actions

According to Graph 18, more than half (58.8%) of jurisdictions require banks to report regularly to supervisors the description of their risk management objectives and policies concerning IRRBB, including the assumptions for NMDs and other products with client-driven behaviour, which raises prepayment and redemption risks.

**Q.16 - Reporting to supervisors of banks' risk management policies and practices with regard to IRRBB, including behavioural assumptions**

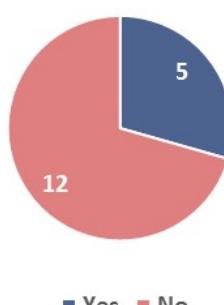


Based on the survey results, we note the following good practices in the reporting to supervisors, which are in line with the 2004 principles and the new Basel capital framework:

- Strategies, processes and methodologies for assessing and measuring IRRBB
- Aggregated exposure levels
- Definition of internal limits
- Estimation of the size and average maturity of core NMDs
- Assumptions and behavioural options relating to prepayment risk of fixed rate loans and early withdrawal of term deposits
- Assessment of the results of simulations and stress tests

Graph 19 shows that less than one third (29.4%) of jurisdictions have supervisory requirements for public disclosure of IRRBB.

**Q.17 - Public disclosure of banks' risk management policies and practices with regard to IRRBB, including behavioural assumptions**



The good practices found with regard to public disclosure are:

- Describing qualitative information about the methodology and measurement systems
- Explaining basic assumptions adopted for the estimation of NMDs, prepayment and redemption risks
- Analysing quantitative information including the increase or decrease in economic value or in net interest income resulting from changes in interest rates
- Quarterly publication of exposure levels to IRRBB

Regarding the on- and off-site assessments, supervisors should evaluate whether a bank has earnings and a capital base that is sufficient to support its level of short- and long-term interest rate risk exposure and the risk those exposures may pose to the bank's future financial performance.<sup>27</sup>

For the IRRBB monitoring process, a bank should use at least an economic value measure and an earnings-based measure for interest rate risk, but more sophisticated business models should consider multiple measures that, in combination, capture all material interest risk types in the banking book.<sup>28</sup>

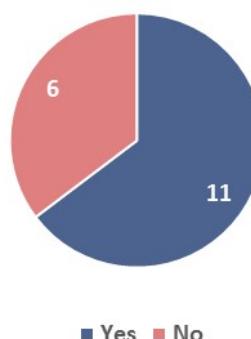
In this regard, Graph 20 shows that most jurisdictions (11 out of the 17) regularly conduct on-site and off-site assessments of IRRBB.

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On-site and off-site supervisory procedures

Graph 20

**Q.18 - Conduct of regular onsite and offsite assessments of IRRBB**



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We see the following good practices in the regular supervisory assessments:

- Evaluating the assignment of instruments to trading and banking books
- Risk-based supervision
- Risk management policies and practices
- Discussion with the asset-liability committee (ALCO)
- Internal controls
- Assessment of limits

<sup>27</sup> See Office of the Comptroller of the Currency, op cit, p 7.

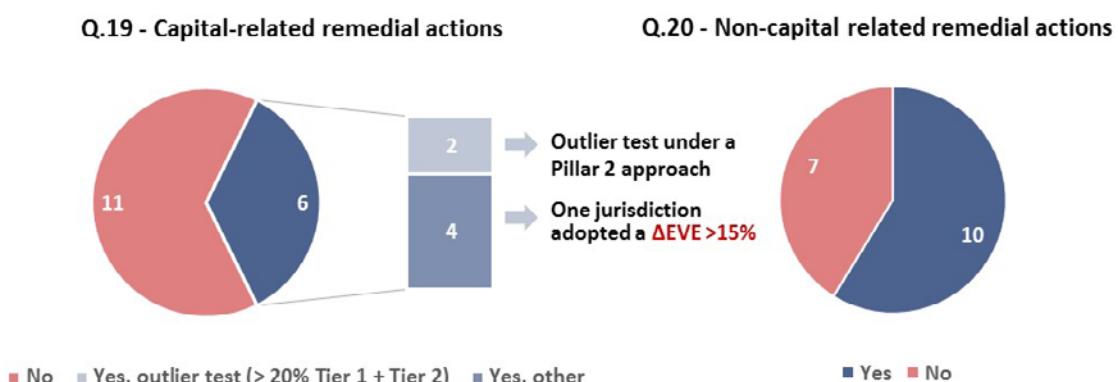
<sup>28</sup> See European Banking Authority, op cit, p 30.

- Stress tests
- Sensitivity analysis
- Supervisory review and evaluation process (SREP) and internal capital adequacy assessment process (ICAAP)
- Monthly off-site monitoring

Finally are two questions related to capital and non-capital related remedial actions. Graph 21 shows that only six (35.3%) jurisdictions adopt some kind of outlier test, similarly to what was prescribed in the 2004 principles and to what is expected under the new IRRBB rules. Considering the non-capital related actions, this percentage is higher (58.8%). Examples of non-capital related remedial actions are strengthening management, policies, procedures, controls and assumptions; and adopting hedging mechanisms.

Capital and non-capital related remedial actions

Graph 21



## 5. Concluding remarks

This paper investigates the potential impact of the revised BCBS framework for IRRBB in ASBA member countries, based on a survey on current supervisory assessments and practices. The preliminary results of this survey was presented and discussed with representatives from ASBA jurisdictions at the FSI-ASBA policy and implementation meeting in early 2016. We received responses from 17 out of 36 ASBA member jurisdictions (and the results should not be generalised to all ASBA member jurisdictions). Based on the survey results, we offer in our findings selected good practices which should support implementation of the revised IRRBB framework.

We highlight the following:

- There is diversity in current bank and supervisory practices in dealing with IRRBB.
- It is important to identify the most prevalent forms of IRRBB (gap, yield curve, option and basis risk) to be able to best measure and manage this risk.
- The treatment of NMDs seems highly relevant, due to a strong influence on the outcomes depending on the modelling assumptions adopted.

- Knowledge of redemption and prepayment rates is important in understanding how banks manage IRRBB.
- Interest rate optionality and basis risk must be assessed, due to the high degree of uncertainty in the cash flows associated with both.
- It is fundamental to discuss the appropriate time horizon for the earnings based measure.
- EVE and NII are the relevant risk measures for the management of IRRBB and related capital adequacy assessment, regardless of whether a Pillar 1 or Pillar 2 approach is adopted. According to the new enhanced Pillar 2 framework, banks should use their IMS to assess IRRBB. However, supervisors can mandate their banks to follow, or a bank could choose to adopt, the standardised framework, which is based solely on the change in EVE.

Two important considerations should help supervisors to better understand IRRBB in their jurisdictions. First, it is of utmost relevance to know the overall size and dynamics of IRRBB within the overall assessment of risks in the financial system. And second, different levels of interest rate shock scenarios, including across jurisdictions and currency regions, can lead to significantly different outcomes, in both the EVE and NII measurement approaches.

We expect that the proper implementation of the revised framework for IRRBB will highlight challenges for supervisors and potentially change day-to-day supervision and bank reporting significantly. We hope that the survey results and ongoing discussions promoted by the FSI and ASBA contribute positively to develop banks' IRRBB management.

## Annex – IRRBB questionnaire

### Part 1: For the purposes of capital requirements for IRRBB

- Q-01. Which approach is currently adopted by your jurisdiction?
- 1: Pillar 1
  - 2: Pillar 2, only
  - 3: Pillar 1 together with Pillar 3 disclosure standards
  - 4: Pillar 2 together with Pillar 3 disclosure standards
- Q-02. Which metric is established by your jurisdiction in Pillar 1?
- 0: not applicable/our jurisdiction has not implemented a Pillar 1 approach
  - 1: economic value based measures (ie economic value (EV) or economic value of equity (EVE))
  - 2: earnings-based measures (ie earnings at risk (EaR) or net interest income (NII))
  - 3: both economic value (ie EV or EVE) and earnings-based measures (ie EaR or NII)
  - 4: other; a description is given in the "remarks" column
- Q-03. Does your jurisdiction prescribe standardised interest rate shock scenarios in Pillar 1 and/or Pillar 2? If yes, please indicate the respective Pillar in the "remarks" column.
- 1: yes; an upward and downward 200 basis point parallel rate shock
  - 2: yes; a parallel rate shock substantially consistent with 1st and 99th percentile of observed interest rate changes using a one-year holding period and a minimum of five years of observations
  - 3: yes; the 1st and 99th percentile of observed interest rate changes using a one-year holding period and a minimum of five years of observations
  - 4: yes; other; a description is given in the "remarks" column
  - 5: no
- Q-04. Does your jurisdiction prescribe supervisory standards or guiding principles for the management and measurement of IRRBB?
- 1: yes; a description is given in the "remarks" column
  - 2: no
- Q-05. Which metric is adopted most frequently by banks in your jurisdiction?
- 0: don't know
  - 1: economic value based measures (ie economic value (EV) or economic value of equity (EVE))
  - 2: earnings-based measures (ie earnings at risk (EaR) or net interest income (NII))
  - 3: both economic value (ie EV or EVE) and earnings-based measures (ie EaR or NII)
  - 4: other; a description is given in the "remarks" column

- Q-06. Does your jurisdiction provide supervisory definitions and standards for credit spread risk in the banking book (CSRBB)?
- 1: yes; a description is given in the "remarks" column
  - 2: no

## Part 2: Specific choices in assessing and measuring IRRBB

- Q-07. What is the most prevalent form of IRRBB in your jurisdiction? Please indicate the relative relevance, if possible.
- 0: not applicable/our jurisdiction cannot respond to this question
  - 1: gap risk; refers to the risk that a bank's assets and liabilities will see their yields (possibly based on a reference interest rate benchmark) change in a way detrimental to the bank's economic value of equity or its cash flows.
  - 2: non-parallel gap risk; refers to the risk arising from changes in the slope and the shape of the yield curve as opposed to a parallel shift
  - 3: optionality risk; non-linear price movements based on changes in interest rates in financial instruments that are either automatic (eg without any action from the client) or behavioural (eg the repricing mechanisms of these financial instruments are unknown in advance as they depend on client behaviour)
  - 4: basis risk; refers to the dislocation between two or more different reference rate curves within or across currencies, as well as between two or more different tenors for the same reference rate curve
  - 5: a combination of 1 to 4 above; a description is given in the "remarks" column
  - 6: other; a description is given in the "remarks" column
- Q-08. Which benchmark interest rate curve is used most frequently by the banks in your jurisdiction for discounting/repricing cash flows in the banking book?
- 0: not applicable/our jurisdiction cannot respond to this question
  - 1: government bond yield curve
  - 2: interest rate swap and/or interbank curve
  - 3: other; a description is given in the "remarks" column
- Q-09. What is the importance for banks in your jurisdiction of core non-maturity deposits (NMDs) (ie the stable part of instruments in which depositors are free to withdraw at any time, since they have no contractually agreed maturity date, such as saving accounts). If possible, please indicate, on a best effort basis, the ratio of core NMDs in relation to total liabilities.
- 0: not applicable/our jurisdiction cannot respond to this question
  - 1: less than 5%
  - 2: 5–10%
  - 3: 10–20%
  - 4: 20–30%
  - 5: more than 30%

- Q-10. Do banks in your jurisdiction model rate-dependent prepayment behaviour in fixed rate loans? Prepayments are typically higher during periods of falling interest rates and lower during periods of rising interest rates. What are reasonable variations around the normally observed prepayment rates in times of decreasing/increasing interest rates?
- 0: not applicable/our jurisdiction cannot respond to this question
  - 1: yes, variations in normally observed prepayment rates of around +/- 10%
  - 2: yes, variations in normally observed prepayment rates of around +/- 20%
  - 3: yes, variations in normally observed prepayment rates of around +/- 30%
  - 4: yes, variations in normally observed prepayment rates are more than around +/- 40%
  - 5: yes, rate-dependent variations in normally observed prepayment rates are not determinable
  - 6: no, fixed rate loans subject to prepayment risk are assumed to be rate-independent and are not explicitly considered by banks in our jurisdiction
- Q-11. Do banks in your jurisdiction model rate-dependent redemption behaviour (eg early withdrawal) for term deposits? Redemptions are typically higher during periods of rising interest rates and lower during periods of falling interest rates. What are reasonable variations around the normally observed redemption rates in times of increasing/decreasing interest rates?
- 0: not applicable/our jurisdiction cannot respond to this question
  - 1: yes, variations in normally observed redemption rates of around +/- 10%
  - 2: yes, variations in normally observed redemption rates of around +/- 20%
  - 3: yes, variations in normally observed redemption rates of around +/- 30%
  - 4: yes, variations in normally observed redemption rates are more than around +/- 40%
  - 5: yes, rate-dependent variations in normally observed redemption rates are not determinable
  - 6: no, term deposits subject to redemption risk are assumed to be rate-independent and are not explicitly considered by the bank's in our jurisdiction
- Q-12. How is the measurement of basis risk typically incorporated by banks in your jurisdiction?
- 0: not applicable/our jurisdiction cannot respond to this question
  - 1: incorporated in an EVE measure
  - 2: incorporated in an earnings-based measure
  - 3: incorporated in an EVE and an earnings-based measure
  - 4: incorporated in another measure; a description is given in the "remarks" column
  - 5: incorporated as an add-on for IRRBB
  - 6: not incorporated

- Q-13. How is the measurement of automatic interest rate options (ie instruments whose market value responds non-linearly to changes in interest rates, without requiring any action from the customer, such as floating rate mortgage loan with embedded caps and/or floors) typically incorporated by banks in your jurisdiction?
- 0: not applicable/our jurisdiction cannot respond to this question
  - 1: incorporated in an EVE measure
  - 2: incorporated in an earnings-based measure
  - 3: incorporated in an EVE and an earnings-based measure
  - 4: incorporated in another measure; a description is given in the "remarks" column
  - 5: incorporated as an add-on for IRRBB
  - 6: not incorporated
- Q-14. Which time horizon is used most frequently by banks in your jurisdiction for measuring IRRBB?
- 0: not applicable/our jurisdiction cannot respond to this question
  - 1: not more than 1 year
  - 2: 1 year
  - 3: 2 years
  - 4: 3 years
  - 5: 4 years
  - 6: more than 4 years
- Q-15. How important are positions in foreign currency for banks in your jurisdiction? If possible, please indicate, on a best effort basis, the ratio of foreign currencies' interest risk exposure in relation to the total exposure measure (eg net notional cash flow or currency aggregation) for the IRRBB.
- 0: not applicable/our jurisdiction cannot respond to this question
  - 1: less than 5%
  - 2: 5–10%
  - 3: 10–20%
  - 4: 20–30%
  - 5: more than 30%

### Part 3: Reporting, disclosure and supervisory actions

- Q-16. Does your jurisdiction require banks to regularly report to supervisors their description of their risk management objectives and policies concerning IRRBB, including the behavioural assumptions regarding NMDs and other products with client-driven behaviour, eg prepayment and redemption risks?
- 1: yes; a broad description of the requirements is given in the "remarks" column
  - 2: no; there are no requirements on regular supervisory reporting

Q-17. Does your jurisdiction require banks to publicly disclose a description of their risk management objectives and policies concerning IRRBB, including the behavioural assumptions regarding NMDs and other products with client-driven behaviour, eg prepayment and redemption risks?

- 1: yes; a broad description is given in the "remarks" column
- 2: no; there are no supervisory requirements for disclosure of IRRBB

Q-18. Does your jurisdiction regularly conduct on-site and off-site assessments of IRRBB?

Answer options

- 1: yes; a description is given in the "remarks" column
- 2: no

Q-19. Does your jurisdiction explicitly require capital-related remedial actions (eg reduction in risk exposure or increase in capital requirements, or a combination of both) for banks based on the supervisory IRRBB measure?

- 1: yes; an outlier test, for banks whose interest rate risk in the banking book leads to an economic value or earnings-based measure decline of more than 20% of the sum of Tier 1 and Tier 2 capital following an interest rate shock
- 2: yes; another action, described in the "remarks" column
- 3: no

Q-20. Does your jurisdiction impose non-capital related remedial actions (eg strengthening management, improving policies, enhancing modelling) on IRRBB?

- 1: yes; a description is given in the "remarks" column
- 2: no