CENTRAL BANK of BELIZE

Basel II/III Implementation

Principles for the Management of Interest Rate Risk in the Banking Book

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Table of Contents

INTRODUCTION

Interest rate risk in the banking book (IRRBB) refers to the current or prospective risk to the bank's capital and earnings arising from adverse movements in interest rates that affect the bank's banking book positions[1]. When interest rates change, the present value and timing of future cash flows change. This in turn changes the underlying value of a bank's assets, liabilities, and off-balance sheet items and hence its economic value (EV). Changes in interest rates also affect a bank's earnings by altering interest rate-sensitive income and expenses, affecting its net interest income (NII). Excessive IRRBB can pose a significant threat to a bank's current capital base and/or future earnings if not managed appropriately.

For the purposes of this document, the three main sub-types of IRRBB are defined as follows:

(i) *Gap risk* arises from the term structure[2] of banking book instruments and describes the risk arising from the timing of instruments' rate changes. For most banks it will be the main driver of IRRBB;

(ii) *Basis risk* describes the impact of relative changes in interest rates for financial instruments that have similar maturities but are priced using different interest rate indices. One example could be a floating rate bond linked to London Inter-Bank Offered Rate (LIBOR), funded with 6-month term deposits whose rate is renegotiated with clients differently from LIBOR; and

(iii) *Option risk* arises from option derivative positions or from optional elements embedded in a bank's assets, liabilities and/or off-balance sheet items, where the bank or its customer can alter the level and timing of their cash flows. Examples include behavioral option risk like loans subject to prepayment risk or term deposits subject to early redemption, but also automatic option risk like financial options sold to customers.

All three sub-types of IRRBB potentially change the price/value or earnings/costs of interest rate sensitive assets, liabilities and/or off-balance sheet items in a way, or at a time, that can adversely affect a bank's financial condition.

The principles put forward in this document outline the Central Bank of Belize's (Central Bank) expectations for the banks' identification, measurement, monitoring and control of IRRBB. This guideline is founded on the Basel Committee on Banking Supervision's *Interest Rate Risk in the Banking Book* (April 2016)[3] and should be applied in concurrences with the requirements stipulated by the Domestic Banks and Financial Institutions Act (DBFIA), International Banking Act (IBA), Practice Directions, Circulars and Guidelines issued by the Central Bank, where applicable.

The guideline should be applied on a proportional basis commensurate with its nature, size and complexity as well as business activities and overall risk profile.

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[1] Banking book positions refers to all on- and off-balance sheet items held with other purposes than short-term resale, profiting from short-term price movements or locking in arbitrage profits (usually designated as the Trading Book).

[2] The term structure of interest rates is the relationship between interest rates and different terms or maturities. When graphed, the term structure of interest rates is known as a yield curve and reflects the expectations of market participants about future changes in interest rates.

[3] https://www.bis.org/bcbs/publ/d368.pdf.

THE IRRBB PRINCIPLES

PRINCIPLE 1

IRRBB is an important risk for all banks that must be specifically identified, measured, monitored and controlled.

1.1 IRRBB is an important risk that arises from banking activities and is encountered by all banks. It arises because interest rates can vary significantly over time, while the business of banking typically involves intermediation activity that produces exposures to both maturity mismatch (e.g. long-maturity assets funded by short-maturity liabilities) and rate mismatch (e.g. fixed rate loans funded by variable rate deposits). In addition, there are optionalities embedded in many of the common banking products (e.g. non-maturity deposits, term deposits, fixed rate loans) that are triggered in accordance with changes in interest rates.

1.2 All banks must be familiar with all elements of IRRBB, actively identify their IRRBB exposures and take appropriate steps to measure, monitor and control it.

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

PRINCIPLE 2

The Board of Directors 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 (henceforth, its delegates). Banks must have an adequate IRRBB management framework, involving regular independent reviews and evaluations of the effectiveness of the system.

2.1 The governing body has responsibility for understanding the nature and the level of the bank's IRRBB exposure. The governing body should approve broad business strategies as well as overall policies with respect to IRRBB. It should ensure that there is clear guidance regarding the acceptable level of IRRBB, given the bank's business strategies.

2.2 Accordingly, the governing body is responsible for ensuring that steps are taken by the bank to identify, measure, monitor and control IRRBB consistent with the approved strategies and policies. More specifically, the governing body or its delegates are responsible for setting:

a. appropriate limits on IRRBB, including the definition of specific procedures and approvals necessary for exceptions, and ensuring compliance with those limits;

b. adequate systems and standards for measuring IRRBB;

c. standards for measuring IRRBB, valuing positions and assessing performance, including procedures for updating interest rate shock and stress scenarios and key underlying assumptions driving the institution's IRRBB analysis;

d. a comprehensive IRRBB reporting and review process; and

e. effective internal controls and management information systems (MIS).

2.3 The governing body or its delegates should oversee the approval, implementation and review of IRRBB management policies, procedures and limits. The governing body should be informed regularly (at least semi-annually) on the level and trend of the bank's IRRBB exposures. It should regularly review timely information that is sufficiently detailed to allow it to understand and assess the performance of its delegates in monitoring and controlling IRRBB in compliance with policies approved by the governing body. Such reviews should be carried out more frequently when the bank runs significant IRRBB exposures or has positions in complex IRRBB instruments.

2.4 While governing body members do not need individually to have detailed technical knowledge of complex financial instruments, or of quantitative risk management techniques, they should understand the implications of the bank's IRRBB strategies, including the potential linkages with and impact on market, liquidity, credit and operational risk. Some of the members should have sufficient technical knowledge to question and challenge the reports made to the governing body. Governing body members are responsible for ensuring that senior management has the capability and skills to understand IRRBB, and that adequate resources are devoted to IRRBB management.

2.5 Many governing bodies delegate the task for developing IRRBB policies and practices to senior management, expert individuals or an asset and liability management committee (ALCO). In the case of an ALCO, it should meet regularly and include representatives from each major department connected to IRRBB.

2.6 The governing body should clearly identify its delegates for managing IRRBB and, to avoid potential conflicts of interest, should ensure that there is adequate separation of responsibilities in key elements of the risk management process. Banks should have IRRBB identification, measurement, monitoring and control functions with clearly defined responsibilities that are sufficiently independent from risk-taking functions of the bank and that report IRRBB exposures directly to the governing body or its delegates.

2.7 The governing body's delegates for IRRBB should include members with clear lines of authority over the units responsible for establishing and managing positions. There should be a clear communication channel to convey the delegates' directives to these line units.

2.8 The governing body should ensure that the bank's organisational structure enables its delegates to carry out their responsibilities and facilitates effective decision-making and good governance. The governing body should encourage discussions between its members and its delegates – as well as between its delegates and others in the bank – regarding the IRRBB management process. The risk management and strategic planning areas of the bank should also communicate regularly to facilitate evaluations of risk arising from future business.

2.9 Banks should have adequate internal controls to ensure the integrity of their IRRBB management process. The internal controls should promote effective and efficient operations, reliable financial and regulatory reporting, and compliance with relevant laws, regulations and bank policies.

2.10 With regard to IRRBB control policies and procedures, banks should have appropriate approval processes, exposure limits, reviews and other mechanisms designed to provide a reasonable assurance that risk management objectives are being achieved.

2.11 In addition, banks should have in place regular evaluations and reviews of their internal control system and risk management processes. This includes ensuring that personnel comply with established policies and procedures. Such reviews should also address any significant changes that may affect the effectiveness of controls (including changes in market conditions, personnel, technology and structures of compliance with exposure limits), and ensure that there are appropriate escalation procedures for any exceeded limits. Banks should ensure that all such evaluations and reviews are conducted regularly by individuals and/or units that are independent of the function they are assigned to review. When revisions or enhancements to internal controls are warranted, there should be an internal review mechanism in place to ensure that these are implemented in a timely manner.

2.12 Banks should have their IRRBB identification, measurement, monitoring and control processes reviewed by an independent auditing function (such as an internal or external auditor) on a regular basis. In such cases, reports written by internal/external auditors or other equivalent external parties (such as consultants) should be made available to the Central Bank.

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.

3.1 Banks should have clearly defined risk appetite statements that are approved by the governing body and implemented through comprehensive risk appetite frameworks, i.e. policies and procedures for limiting and controlling IRRBB. The risk appetite framework should delineate delegated powers, lines of responsibility and accountability over IRRBB management decisions and should clearly define authorised instruments, hedging strategies and risk-taking opportunities. All IRRBB policies should be reviewed periodically (at least annually) and revised as needed.

3.2 Policy limits set by the governing bodies should be consistent with the bank's overall approach for measuring IRRBB. Aggregate risk limits, clearly articulating the amount of IRRBB acceptable to the governing body, should be applied on a consolidated basis and, as appropriate, at the level of individual affiliates. 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. The interest rate movements used in developing these limits should represent meaningful shock and stress situations, considering historical interest rate volatility and the time required by management to mitigate those risk exposures.

3.3 Policy limits should be appropriate to the nature, size, complexity, and capital adequacy of the bank, as well as its ability to measure and manage its risks. Depending on the nature of a bank's activities and business model, sub-limits may also be identified for individual business units, portfolios, instrument types or specific instruments. The level of detail of risk limits should reflect the characteristics of the bank's holdings, including the various sources of the bank's IRRBB exposures. Banks with significant exposures to gap risk, basis risk or positions with explicit or embedded options should establish risk tolerances appropriate for these risks.

3.4 There should be systems in place to ensure that positions that exceed, or are likely to exceed, limits defined by the governing body, or its delegates should receive prompt management attention and be escalated without delay. There should be a clear policy on who will be informed, how the communication will take place and the actions which will be taken in response to an exception.

PRINCIPLE 4

Measurement of IRRBB should ideally 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.

4.1 Banks' internal management system (IMS) should capture all material sources of IRRBB and assess the effect of market changes on the scope of their activities. In addition to the impact of an interest rate shock on its economic value, a bank's policy approach should consider its ability to generate stable earnings sufficient to maintain its normal business operations.

4.2 Banks should pay attention to the complementary nature of economic value and earnings-based measures in their risk and internal capital assessments, in particular in terms of:

a. outcomes: economic value measures compute a change in the net present value of the bank's assets, liabilities and off-balance sheet items subject to specific interest rate shock and stress scenarios, while earnings-based measures focus on changes to future profitability within a given time horizon eventually affecting future levels of a bank's own equity capital;

b. assessment horizons: economic value measures reflect changes in value over the remaining life of the bank's assets, liabilities and off-balance sheet items, i.e. until all positions have run off, while earnings-based measures cover only the short to medium term, and therefore do not fully capture those risks that will continue to impact profit and loss accounts beyond the period of estimation; and

c. future business/production: economic value measures consider the net present value of repricing cash flows of instruments on the bank's balance sheet or accounted for as an off-balance sheet item (i.e. a run-off view). Earnings measures may, in addition to a run-off view, assume rollover of maturing items (i.e. a constant balance sheet view) and/or assess the scenario-consistent impact on the bank's future earnings inclusive of future business (i.e. a dynamic view).

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

a. internally selected interest rate shock scenarios addressing the bank's risk profile, according to its Internal Capital Adequacy Assessment Process (ICAAP);

b. historical and hypothetical interest rate stress scenarios, which tend to be more severe than shock scenarios; and

c. any additional interest rate shock scenarios required by supervisors.

4.4 Banks should measure their vulnerability to loss under stressful market conditions – including the breakdown of key assumptions – and consider those results when establishing and reviewing their policies and limits for IRRBB.

4.5 A bank should develop and implement an effective stress testing framework for IRRBB as part of its broader risk management and governance processes. This should feed into the decision-making process at the appropriate management level, including strategic decisions (e.g. business and capital planning decisions) of the governing body or its delegates. In particular, IRRBB stress testing should be considered in the ICAAP, requiring banks to undertake rigorous, forward-looking stress testing that identifies events of severe changes in market conditions which could adversely impact the bank's capital or earnings, possibly also through changes in the behaviour of its customer base.

PRINCIPLE 5

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

5.1 Both economic value and earnings-based measures of IRRBB are significantly impacted by a number of assumptions made for the purposes of risk quantification, namely:

a. 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;
b. treatment of balances and interest flows arising from non-maturity deposits (NMDs);
c. treatment of own equity in economic value measures; and
d. the implications of accounting practices for IRRBB.

5.2 Hence, when assessing its IRRBB exposures, a bank should make judgments and assumptions about how an instrument's actual maturity or repricing behaviour may vary from the instrument's contractual terms because of behavioural optionalities.

5.3 Common products with behavioural optionalities include:

a. Fixed rate loans subject to prepayment risk – Banks should understand the nature of prepayment risk for their portfolios and make reasonable and prudent estimates of the expected prepayments. The assumptions underlying the estimates and where prepayment penalties or other contractual features affect the embedded optionality effect should be documented. There are several factors that are important determinants of the bank's estimate of the effect of each interest rate shock and stress scenario on the average prepayment speed. Specifically, a bank must assess the expected average prepayment speed under each scenario.

b. Fixed rate loan commitments – Banks may sell options to retail customers (eg prospective mortgage buyers or renewers) whereby, for a limited period, the customers can choose to draw down a loan at a committed rate. Unlike loan commitments to corporates, where drawdowns strongly reflect characteristics of automatic interest rate options, mortgage commitments (ie pipelines) to retail customers are impacted by other drivers.

c. Term deposits subject to early redemption risk – Banks may attract deposits with a contractual maturity term or with step-up clauses that enable the depositor at different time periods to modify the speed of redemption. The classification scheme should be documented whether a term deposit is deemed to be subject to redemption penalties or to other contractual features that preserve the cash flow profile of the instrument.

d. NMDs – Behavioural assumptions for deposits that have no specific repricing date can be a major determinant of IRRBB exposures under the economic value and earnings-based measures. Banks should document, monitor and regularly update key assumptions for NMD balances and behaviour used in their IMS. To determine the appropriate assumptions for its NMDs, a bank should analyse its depositor base in order to identify the proportion of core deposits (ie NMDs which are unlikely to reprice even under significant changes in interest rate environment). Assumptions should vary according to depositor characteristics (eg retail/wholesale) and account characteristics (eg transactional/non-transactional).

5.4 Modelling assumptions should be conceptually sound and reasonable, and consistent with historical experience. Banks must carefully consider how the exercise of the behavioural optionality will vary not only under the interest rate shock and stress scenario but also across other dimensions[4].

5.5 In addition, banks with positions denominated in different currencies can expose themselves to IRRBB in each of those currencies. Since yield curves vary from currency to currency, banks generally need to assess exposures in each currency.

5.6 Banks should be able to test the appropriateness of key behavioural assumptions, and all changes to the assumptions of key parameters should be documented. Banks should periodically perform sensitivity analyses for key assumptions to monitor their impact on measured IRRBB. Sensitivity analyses should be performed with reference to both economic value and earnings-based measures.

5.7 The most significant assumptions underlying the system should be documented and clearly understood by the governing body or its delegates. Documentation should also include descriptions on how those assumptions could potentially affect the bank's hedging strategies.

5.8 As market conditions, competitive environments and strategies change over time, the bank should review significant measurement assumptions at least annually and more frequently during rapidly changing market conditions. For example, if the competitive market has changed such that consumers now have lower transaction costs available to them for refinancing their residential mortgages, prepayments may become more sensitive to smaller reductions in interest rates.

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.

6.1 Accurate and timely measurement of IRRBB is necessary for effective risk management and control. A bank's risk measurement system should be able to identify and quantify the major sources of IRRBB exposure. The mix of a bank's business lines, and the risk characteristics of its activities should guide management's selection of the most appropriate form of measurement system.

6.2 Banks should not rely on a single measure of risk, given that risk management systems tend to vary in how they capture the components of IRRBB. Instead, banks should use a variety of methodologies to quantify their IRRBB exposures ideally under both the economic value and earnings-based measures, ranging from simple calculations based on static simulations using current holdings to more sophisticated dynamic modelling techniques that reflect potential future business activities.

6.3 A bank's MIS should allow it to retrieve accurate IRRBB information in a timely manner. The MIS should capture interest rate risk data on all the bank's material IRRBB exposures. There should be sufficient documentation of the major data sources used in the bank's risk measurement process.

6.4 Data inputs should be automated as much as possible to reduce administrative errors. Data mapping should be periodically reviewed and tested against an approved model version. A bank should monitor the type of data extracts and set appropriate controls.

[4] For additional considerations, kindly refer to paragraph 46 of the Basel Committee on Banking Supervision's *Interest Rate Risk in the Banking Book* (April 2016).

6.5 Where cash flows are slotted into different time buckets (eg for gap analyses) or assigned to different vertex points to reflect the different tenors of the interest rate curve, the slotting criteria should be stable over time to allow for a meaningful comparison of risk figures over different periods.

6.6 Banks' IMS should be able to compute economic value and earnings-based measures of IRRBB, as well as other measures of IRRBB prescribed by the Central Bank, based on the interest rate shock and stress scenarios. It should also be sufficiently flexible to incorporate supervisory imposed constraints on banks' internal risk parameter estimates.

6.7 The validation of IRRBB measurement methods and assessment of corresponding model risk should be included in a formal policy process that should be reviewed and approved by the governing body or its delegates.

6.8 The policy should specify the management roles and designate who is responsible for the development, implementation and use of models. In addition, the model oversight responsibilities as well as policies including the development of initial and ongoing validation procedures, evaluation of results, approval, version control, exception, escalation, modification and decommission processes need to be specified and integrated within the governance processes for model risk management.

6.9 An effective validation framework should include three core elements:

a. evaluation of conceptual/methodological soundness, including developmental evidence;
b. ongoing model monitoring, including process verification and benchmarking; and
c. outcomes analysis, including backtesting of key internal parameters (eg stability of deposits, prepayments, early redemptions, pricing of instruments).

6.10 IRRBB models might include those developed by third-party vendors. Model inputs or assumptions may also be sourced from related modelling processes or sub-models (both in-house and vendor-sourced) and should be included in the validation process. The bank should document and explain model specification choices as part of the validation process.

6.11 Banks that purchase IRRBB models should ensure there is adequate documentation of their use of those models, including any specific customisation. If vendors provide input for market data, behavioural assumptions or model settings, the bank should have a process in place to determine if those inputs are reasonable for its business and the risk characteristics of its activities.

6.12 Internal audit should review the model risk management process as part of its annual risk assessment and audit plans. The audit activity should not duplicate model risk management processes but should review the integrity and effectiveness of the risk management system and the model risk management process.

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).

7.1 The reporting of risk measures to the governing body or its delegates should be regular and should compare current exposure with policy limits. In particular, reporting should include the results of the periodic model reviews and audits as well as comparisons of past forecasts or risk estimates with actual results to inform potential modelling shortcomings on a regular basis. Portfolios that may be subject to significant mark-to-market movements should be clearly identified within the bank's MIS and subject to oversight in line with any other portfolios exposed to market risk.

7.2 While the types of reports prepared for the governing body or its delegates will vary based on the bank's portfolio composition, they should include at least the following:

a. summaries of the bank's aggregate IRRBB exposures, and explanatory text that highlights the assets, liabilities, cash flows, and strategies that are driving the level and direction of IRRBB;
b. reports demonstrating the bank's compliance with policies and limits;
c. key modelling assumptions such as NMD characteristics, prepayments on fixed rate loans and currency aggregation;
d. results of stress tests, including assessment of sensitivity to key assumptions and parameters; and
e. summaries of the reviews of IRRBB policies, procedures, and adequacy of the measurement systems, including any findings of internal and external auditors and/or other equivalent external parties (such as consultants).

7.3 Reports detailing the bank's IRRBB exposures should be provided to the bank's governing body or its delegates on a timely basis and reviewed regularly. The IRRBB reports should provide aggregate information as well as sufficient supporting detail to enable the governing body or its delegates to assess the sensitivity of the bank to changes in market conditions, with particular reference to portfolios that may potentially be subject to significant mark-to-market movements. The governing body or its delegates should review the bank's IRRBB management policies and procedures in light of the reports, to ensure that they remain appropriate and sound. The governing body or its delegates should also ensure that analysis and risk management activities related to IRRBB are conducted by competent staff with technical knowledge and experience, consistent with the nature and scope of the bank's activities.