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CONTENTS

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PRUDENTIAL STANDARD FOR THE MANAGEMENT OF INTEREST RATE RISK IN THE BANKING BOOK FOR FINANCIAL INSTITUTIONS LICENSED UNDER THE BANKING ACT, 2015

EASTERN CARIBBEAN CENTRAL BANK
ST KITTS

August 2024

Revisions Control Page

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LIST OF ACRONYMS

ALCO	Asset and Liability Committee
BCBS	Basel Committee on Banking Supervision
CET1	Common Equity Tier 1
CPR	Conditional prepayment rate
EaR	Earnings at risk
EVE	Economic value of equity
ICAAP	Internal Capital Adequacy Assessment Process
IRRBB	Interest rate risk in the banking book
LFI	Licensed financial institution
NII	Net interest income
NIM	Net interest margin
NMD	Non-maturity deposits
RAS	Risk appetite statement

PRUDENTIAL STANDARD (NO 1 OF 2024)

1.0 INTRODUCTION

1 The Prudential Standard for the Management of Interest Rate Risk in the Banking Book for Financial Institutions Licensed Under the Banking Act, 2015 (Standard) is issued by the Eastern Caribbean Central Bank (Central Bank), in exercise of the powers conferred on it by section 184 of the Banking Act, 2015[1], as amended (hereinafter referred to as the Act[2]).

2.0 COMMENCEMENT

2 This Standard shall come into effect on the 1 day of April 2025.

3.0 INTERPRETATION

3 This section of the Standard employs the interpretation established in the Act, however, the following terms are defined for the purpose of this Standard:

a) **Banking Book Instruments:** Financial instruments that do not meet the definition of the trading book and include on and off-balance sheet items sensitive to interest rate changes.

b) **Core Deposits:** These are deposits that are highly likely to remain stable in terms of volume and are unlikely to reprice after interest rate changes.

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[1] Section 183 of Anguilla Banking Act, 2015, as amended.
[2] Anguilla Banking Act No 6 of 2015, as amended;
Antigua and Barbuda Banking Act No 10 of 2015, as amended;
Commonwealth of Dominica Banking Act No 4 of 2015, as amended;
Grenada Banking Act No 20 of 2015, as amended;
Montserrat Banking Act No 15 of 2015, as amended;
Saint Christopher and Nevis Banking Act No 1 of 2015, as amended;
Saint Lucia Banking Act No 3 of 2015; and
Saint Vincent and the Grenadines Banking Act No 4 of 2015, as amended.

c) **Earnings at Risk**: The potential impact of interest rate changes on the net interest income and other sources of income earned on the licensed financial institution's (LFI) banking book.

d) **Economic Value:** The economic value of an instrument represents the present value of its expected net cash flows, discounted to reflect market rates.

e) **Economic Value of Equity (EVE):** The calculation of cash flow that takes the present value of all assets' cash flows and deducts the same from the present value of liabilities' cash flows. LFIs can use the change in EVE as a measure of loss/gain in capital.

f) **Interest Rate Risk in the Banking Book (IRRBB):** The current or prospective risk to a LFI's capital and earnings, arising from the impact of adverse movements in interest rates on its banking book positions. IRRBB arises due to interest rate variability over time, while the business of banking typically involves intermediation activity that produces exposures to both maturity mismatch (such as long-maturity assets funded by short-maturity liabilities) and rate mismatch (such as fixed rate loans funded by variable rate deposits). The three (3) main sub-types of IRRBB are gap risk (or yield curve risk), basis risk, and option risk (**see definitions in Appendix 1).**

g) **IRRBB Capital Needs:** The capital a LFI is required to hold to protect itself against unexpected losses driven by adverse changes in interest rate risk under Pillar 2.

h) **IRRBB Framework:** The organisational structures, processes and

i) **IRRBB Measurement System:** The various systems and data used internally[3] to measure IRRBB. A LFI's IRRBB measurement system forms part of its management of IRRBB framework.

j) **Non-maturity deposits:** This represents deposit liabilities of the LFI which do not have a contractual maturity date.

k) **Trading Book[4]:** The LFI's portfolio comprising of financial instruments, measured at fair value through profit and loss, held for one or more of the following purposes:

i. Short-term resale;
ii. Profiting from short-term price movements;
iii. Locking in arbitrage profits; and/or
iv. Hedging risks that arise from instruments meeting criteria (i), (ii) or (iii) above.

Trading book items are those accounted for at fair value through profit and loss.

4.0 OBJECTIVES

4 This Standard seeks to:

a) Outline the supervisory requirements of LFIs in relation to the identification, measurement and management of IRRBB including:

(i) The principles and methods to be adopted;
(ii) The specific systems to be implemented; and
(iii) Internal governance and control arrangement.

[3] At the appropriate time in the future, the Central Bank intends to implement the BCBS' standardised methodology for the measurement of IRRBB, which derives an economic value of equity risk measure for IRRBB. This framework includes a maturity schedule and six interest rate shock scenarios that LFIs will eventually be expected to use.

[4] For further information on the trading book, see section 9 of the Prudential Standard for Capital Measurement: Basel II/III Definition of Capital and Pillar I Framework.

b) Provide the minimum policies and procedures that each LFI should have in place, within their overall corporate governance processes and risk management framework, to manage IRRBB.

5.0 APPLICATION

5 This Standard applies to all financial institutions licensed under the Banking Act, 2015. Section 9 provides guidance on regulatory reporting. Notwithstanding, the LFIs to which Basel II/III applies[5] will have additional reporting requirements (for example, with the ICAAP).

6 For subsidiaries where the parent company has implemented a management of IRRBB framework that is consistent with this Standard, and which provides for the subsidiary in question, the Central Bank will consider the merits of such a case. If the parent company's IRRBB framework is deemed satisfactory, the Central Bank may exempt the subsidiary from establishing a separate framework, where appropriate, provided that the subsidiary can demonstrate that it clearly understands and applies the methodology provided.

6.0 OVERVIEW OF THE STANDARD

7 A framework that manages IRRBB to prudent levels is a fundamental component of sound banking practice. This Standard is consistent with the principles of the Basel Committee on Banking Supervision's (BCBS) *Standards on Interest Rate Risk in the Banking Book*[6], published in April 2016. The Central Bank anticipates that in implementing the principles outlined in this Standard, the board of directors (the board) and senior management of LFIs should be positioned to exercise sound oversight to effectively identify, measure, monitor and control IRRBB.

[5] The LFIs to which Basel II/III applies are already aware of this requirement.
[6] This paper can be accessed via the link https://www.bis.org/bcbs/publ/d368.pdf. In December 2023, the BCBS proposed revisions to this standard to adjust the specified interest rate shocks. Please visit Recalibration of shocks for interest rate risk in the banking book (bis.org) for more information.

7.0 PRUDENTIAL STANDARD REQUIREMENTS

7.1 THE TRADING BOOK/BANKING BOOK BOUNDARY

8 While LFIs are exposed to interest rate risk in both the trading book and banking book, the Central Bank recognises the importance of clearly distinguishing between the two. LFIs must document and disclose their policies for the assignment of instruments to either the trading book or banking book.

9 LFIs are restricted from switching instruments after initial designation and may be permitted to do so only in exceptional circumstances, subject to the Central Bank's approval.

10 This Standard only focuses on interest rate risk with respect to the banking book exposures, as interest rate risk arising from trading book exposures is covered under the Pillar 1 market risk regulations[7].

7.2 PERSPECTIVES FOR ASSESSING IRRBB

11 When interest rates change, the present value and timing of future cash flows change. These changes in turn affect the underlying value of LFIs' rate-sensitive assets, liabilities, and off-balance sheet items and hence, their economic value (EV). Changes in interest rates also affect LFIs' earnings by altering interest rate-sensitive income and expenses, affecting their net interest income (NII). IRRBB exposures can therefore be assessed from separate but complementary perspectives, as highlighted below:

7 Details of the Pillar 1 market risk capital adequacy requirements are outlined in the *Prudential Standard for Capital Measurement: Basel II/III Definition of Capital and Pillar Framework*.

7.2.1 Earnings Perspective

12 The earnings perspective (or income effect) provides a short term[8] perspective, and focuses on the impact of interest rate changes on accruing or reported earnings. This reflects both the importance of NII[9] in LFIs' overall earnings and its direct link to changes in interest rates[10]. Since reduced earnings or outright losses can threaten the financial viability of a LFI by undermining its capital and by reducing market confidence, LFIs should assess the impact of interest rate changes on:

a) NII; and

b) Activities that generate fee-based and other non-interest income such as loan servicing and asset securitisation, which can be highly sensitive to interest rates.

7.2.2 Economic Value Perspective

13 Variations in interest rates can affect the economic value of LFIs' assets, liabilities and off-balance sheet positions from a long term perspective. The economic value of an instrument represents the calculation of the present value of its expected net cash flows, discounted at an appropriate interest rate that represents the risk associated with the cash flows and to reflect market rates. Just as fluctuations in interest rates will affect a LFI's earnings, they will also affect its economic value and therefore the change in its capital requirement. Under the economic value perspective, LFIs should assess the potential long term effects of changes in interest rates on their overall position.

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[8] Short term means overnight to < two (2) years; medium term 2 years to <7 years; and long term 7 years and over.

[9] NII is the difference between total interest income and total interest expense.

[10] Note that as some LFIs expanded increasingly into activities that generate fee-based income and other non-interest income, a broader focus on operating earnings/overall net income (incorporating both interest and non-interest income and expenses) has become more common.

7.3 Supervisory Expectations

14 LFIs are required to assess their exposure to IRRBB and implement a comprehensive IRRBB management process that is subjected to board and senior management oversight. The IRRBB management framework should be proportional to the LFI's size, level of exposure to IRRBB and the range and complexity of activities undertaken. The Central Bank will use the following nine (9) principles as supervisory criteria to evaluate the IRRBB management framework of LFIs.

7.3.1 Principle 1: Elements of IRRBB

15 LFIs are expected to be familiar with all elements of IRRBB and on a continuous basis identify, monitor, measure and control their exposure to IRRBB including the IRRBB inherent in their products and activities. Products and activities that are new to a LFI must undergo a careful pre-acquisition review to ensure that the IRRBB characteristics are well understood. The management of a LFI's IRRBB should be integrated within its broader risk management framework and aligned with its business planning and budgeting activities.

7.3.2 Principle 2: Governance and Management of IRRBB Framework

16 To develop a comprehensive management framework for IRRBB, the following are required, at a minimum:

7.3.2.1 General Requirements of Management of IRRBB Framework

17 The LFI's management of IRRBB framework must:

a) Be clearly documented, and commensurate with the nature, scale and complexity of its operations;

b) Clearly assign accountabilities for monitoring its exposures against limits, approving variation on limits, and responding to, and escalating any breaches of IRRBB limits;

c) Clearly articulate the responsibilities of, and reporting relationships to the board and where applicable, the relevant board committee[11]; and

d) Be effectively supervised by the board and senior management.

18 Regardless of the size of the LFI, the board and senior management should ensure adequate segregation of duties in key elements of the risk management process to avoid potential conflicts of interest. Thus, LFIs should have risk measurement, monitoring, and control functions with clearly defined duties that are sufficiently independent from its position-taking functions, which report risk exposures directly to senior management and the board.

19 The board may delegate responsibility for establishing IRRBB polices and strategies to an appropriate committee which is sufficiently independent from position taking decisions (for example, the Asset and Liability Committee[12] (ALCO)). Larger or more complex LFIs should have such committees responsible for the design and administration of IRRBB management.

7.3.2.2 Board of Directors' Responsibilities:

20 The board is ultimately responsible for understanding the LFI's nature and level of IRRBB exposure and its management of IRRBB.

21 Generally, the responsibilities of the board are to:

a) Approve broad objectives, business strategies, as well as overall policies with respect to IRRBB. These policies should identify lines of authority

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[11] All references to the board includes any relevant board committee(s).

[12] The ALCO oversees the LFI's operations relating to interest-rate risk, market risk and liquidity risk and, in particular, ensures that the organisation has adequate funds to meet its obligations. Other functions of the committee are dependent on the organisation's lines of business and asset/liability mix.

and responsibility for managing IRRBB exposures and ensure that adequate resources are allocated;

b) Ensure that there is clear guidance regarding the acceptable level of IRRBB, given the LFI's business strategies;

c) Ensure that steps are taken for the LFI to identify, measure, monitor and control IRRBB consistent with the approved strategies and policies. More specifically, the board is responsible for:

   (i) The LFI's tolerance for IRRBB and providing clear guidance to senior management regarding the board's tolerance for this risk including approving relevant risk limits and ensuring compliance with those limits;

   (ii) Ensuring the development of adequate systems, tools and standards for measuring IRRBB;

   (iii) Ensuring the development of standards for measuring IRRBB, valuing positions and assessing performance including procedures for updating interest rate shocks and stress scenarios and key underlying assumptions driving the institution's IRRBB analysis;

   (iv) Ensuring the development of a comprehensive internal IRRBB reporting and reviewing process that includes all repricing and maturity data such as current balance and contractual rate of interest associated with the instruments and portfolios; principal payments; interest reset dates; maturities; the rate index used for repricing; and contractual interest rate ceilings or floors for adjustable-rate items; and

   (v) Ensuring effective internal controls and management information systems.

d) Establish the LFI's risk appetite for IRRBB;

e) Provide oversight of the LFI's management of IRRBB framework;

f) Understand the implications of the LFI's IRRBB strategies including the potential linkages with and impact on market, liquidity, credit and operational risks;

g) Ensure the framework is subject to periodic review by a suitable independent party, in accordance with **Section 7.3.2.4.1** of this Standard;

h) Regularly review management of IRRBB reports (***see Section 9 of this Standard***) to ensure that IRRBB is appropriately managed. The board should have sufficient technical knowledge to question and challenge the reports being presented;

i) Facilitate capacity building opportunities to increase senior management's understanding of the IRRBB incurred by the LFI and encourage discussions between its members, as well as between its members and senior management, regarding the management of IRRBB process;

j) Periodically review information that is sufficient in detail and timely, to assess senior management's performance in monitoring and controlling IRRBB, in compliance with the board-approved strategies and policies. Such reviews should be carried out more frequently when the LFI has significant IRRBB exposures or has positions in complex IRRBB instruments;

k) Periodically assess compliance with approved policies, procedures, and risk limits; and

l) Re-evaluate significant IRRBB management policies, procedures and risk limits, at least annually.

7.3.2.3 Senior Management's Responsibilities

22 The general responsibilities of senior management are as follows:

a) Implement the LFI's management of IRRBB framework and ensure its effective operation over time;

b) Ensure that roles and responsibilities of personnel and functions involved in the management of IRRBB are clearly defined and documented;

c) Develop and implement appropriate policies relating to the management of IRRBB framework; and be responsible for the design and maintenance of the management of IRRBB framework;

d) Ensure the management and measurement of IRRBB including holding regular meetings to discuss the performance of the management of IRRBB framework, areas requiring improvement and the status of efforts to address previously identified deficiencies;

e) Ensure that the personnel responsible for the management, measurement and control of IRRBB are sufficiently skilled so that the management of IRRBB framework is effective;

f) Notify the board of material changes[13] or exceptions from established policies that could have an impact on the operation of the management of IRRBB framework including the capital allocated to cover losses arising from IRRBB;

g) Continuously monitor the LFI's compliance with the management of IRRBB framework, and produce and analyse regular reports on the output of the management information systems;

h) Prior to introducing a new product, instrument type or activity, assess the IRRBB characteristics and have adequate operational procedures and risk control systems in place;

i) Ensure adherence to the lines of authority and responsibility that the board has approved for managing, measuring, controlling and reporting IRRBB exposures;

j) Oversee the implementation and maintenance of management information and other systems that measure, monitor, control and report the LFI's IRRBB;

k) Establish and maintain effective internal controls over the management of IRRBB framework which should include the following:

(i) Adequate policies and procedures;

(ii) Appropriate risk identification, measurement, monitoring and control functions; and

(iii) Comprehensive internal controls and independent audits.

[13] Materiality refers to the nature, size, complexity and implications of a transaction that involves IRRBB. LFIs should develop materiality criteria for each type and category of IRRBB transactions. In addition, internal reporting thresholds should be set for each type and category.

l) Monitor the LFI's overall IRRBB exposure and ensure that the level of IRRBB is maintained at limits consistent with its approved risk appetite.

7.3.2.4 Internal Controls

23 LFIs should have adequate internal controls to ensure the integrity of their IRRBB management process. Procedures can include appropriate approval processes, exposure limits, reviews and other mechanisms designed to provide a reasonable assurance that risk management objectives are being achieved.

24 In addition, LFIs 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, and ensure that there are appropriate escalation procedures for any exceeded limits. Such evaluations and reviews are to be 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.

25 The use of hedging techniques is one method of managing and controlling interest rate risk. Financial instruments can be used for hedging purposes, the most common one being derivative instruments[14]. Each LFI should consider which instruments and techniques are appropriate for the nature and extent of its interest rate risk activities, the necessary skills and

[14] LFIs will need authorisation from the Central Bank to engage in Over-the-Counter Derivative (OTC) other than simple forwards on FX and interest rates, FX swaps, currency swaps on interest rates swaps.

experience of management, and the capacity of the IRRBB reporting and control systems.

7.3.2.4.1 Internal Reviews and Independent Audits

26 LFIs should regularly conduct independent reviews and audits of their IRRBB identification, measurement, monitoring and control processes to ensure integrity, accuracy and reasonableness. Management should ensure that internal reviews and evaluations are conducted regularly by personnel who are independent of the function that is being reviewed.

27 LFIs are required to have reviews conducted by an independent audit function at least annually.

28 Reports written by the independent reviewer (for example, internal/external auditors or other equivalent external parties such as consultants) should be made available to the relevant supervisory authorities.

29 The following factors should be considered by the internal reviewer and the independent auditor, as appropriate, in undertaking the assessments:

a) The level of IRRBB and the quality of IRRBB management;
b) The volume and price sensitivity of various products;
c) The vulnerability of earnings and capital under differing interest rate changes;
d) The exposure of earnings and economic value to various forms of IRRBB;
e) The extent of the board and senior management involvement in the risk control process;
f) The adequacy of a LFI's documented internal policies, controls and procedures concerning IRRBB and the extent to which they are complied with;

g) The adequacy of, and personnel's compliance with, the institution's risk measurement system;

h) The appropriateness of the LFI's risk measurement system, given the nature, scope and complexity of its activities;

i) The accuracy and completeness of data inputs into the LFI's risk measurement system, and the appropriateness and reliability of the process to ensure integrity and consistency;

j) The assumptions, parameters, and methodologies used in IRRBB measurement systems; and

k) The reasonableness and validity of scenarios used in the risk measurement system. The validity of the risk measurement calculations is often tested by comparing actual versus forecasted results.

30 The scope, formality and frequency of conducting internal reviews or independent audits will depend on the size and complexity of the LFI. The results of the review or audit must be reported to the board.

7.3.2.5 Stress Testing

31 A LFI must develop and implement an effective stress testing framework[15] for IRRBB as part of its broader risk management and governance processes, commensurate with its nature, size and complexity, as well as business activities and overall risk profile. The stress testing framework should include consideration of the impact of severe market conditions including sudden changes in interest rates on the economic value of the banking book and net interest income.

32 A LFI's IRRBB stress testing framework must:

[15] Please refer to the Central Bank's Prudential Standard on Stress Testing issued in July 2023.

a) Feed into the decision-making process at the appropriate management level including strategic decisions (for example, business and capital planning decisions) of the board;

b) Include internally selected interest rate shock scenarios tailored to the LFI's business activities and risk profile, according to its Internal Capital Adequacy Assessment Process (ICAAP), if applicable;

c) Include multiple stress scenarios, with some based on historical events and others being hypothetical and forward-looking;

d) Have clearly defined objectives, well documented assumptions and sound methodologies;

e) Consider wide-ranging scenarios, give special considerations to instruments or markets where concentrations exist and include scenarios that capture the exercise of behavioural options (for example, non-maturing deposits, fixed rate loans subject to prepayment risk, term deposits subject to early redemption risk, or fixed rate commitments), in the development of their interest rate shocks and stress scenarios for IRRBB;

f) Communicate risks, both within the LFI and externally with the Central Bank and the market, through appropriate reporting and disclosures; and

g) Include any additional interest rate shock scenarios prescribed by the Central Bank.

33 LFIs are expected to perform qualitative and quantitative reverse stress tests[16] to:

(i) Identify interest rate scenarios that could severely threaten their capital and earnings; and

(ii) Reveal vulnerabilities arising from their hedging strategies and the potential behavioural reactions of their customers.

[16] Reverse stress tests are stress tests that starts from the identification of the pre-defined outcome (for example, points at which the business model becomes unviable) and then explore scenarios and circumstances that might cause this to occur.

34 A LFI's policies and limits for IRRBB must reflect the results of stress testing exercises. Furthermore, the LFI must regularly communicate these results to the board and senior management.

35 As part of its assessment of LFIs' interest rate risk arrangements, the Central Bank will expect LFIs to provide such results expressed in terms of the threat to economic value and earnings, using appropriate interest rate shock scenarios.

7.3.3 Principle 3: Risk Appetite

36 In the context of IRRBB, a risk appetite statement (RAS) is a written articulation of the aggregate level and types of IRRBB exposures that a LFI will accept or avoid, in order to achieve its business objectives. LFIs should have a board-approved and clear RAS for IRRBB, and this should be articulated in terms of the risk to both EVE and earnings. 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. It is expected that the risk appetite for IRRBB will be implemented through the LFI's corporate risk appetite framework.

37 The LFI's approach to monitor its risk appetite, including the applicable limits, will be subject to the Central Bank's supervisory review and evaluation.

7.3.3.1 IRRBB Limits

38 Internal policy limits set by the board should be consistent with the LFI's overall approach for measuring IRRBB. Aggregate risk limits, clearly articulating the amount of IRRBB acceptable to the board, should be applied on an individual basis and, as appropriate, on a consolidated basis.

39 Limits may be associated with specific scenarios of changes in interest rates and/or term structures[17] 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, taking into account historical interest rate volatility and the time required by management to mitigate those risk exposures.

40 Policy limits should be appropriate to the nature, size, complexity and capital adequacy of the LFI, as well as its ability to measure and manage its risks. Depending on the nature of a LFI's activities and business model, sub-limits may also be identified for individual business units, portfolios, instrument types or specific instruments.

41 The board should approve significant hedging or risk-taking initiatives in advance of implementation. A dedicated set of risk limits should be developed to monitor the evolution of hedging strategies that rely on instruments such as derivatives, and to control mark-to-market risks in instruments that are accounted for at market value.

42 There should be systems in place to ensure that positions that exceed, or are likely to exceed limits approved by the board, 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[18].

[17]Term structure shows the relationship between the interest rates (or yields) and the time to maturity (short-term to long-term) for various banking book instruments.
[18] Limits could be absolute in the sense that they should never be exceeded or whether, under specific circumstances, breaches of limits can be tolerated for a predetermined short period.

7.3.4 Principle 4: IRRBB Measurement

43 Accurate and timely identification and measurement of IRRBB are necessary for the effective functioning of the management of IRRBB framework. In addition to the impact of an interest rate shocks on its economic value, a LFI's policy approach should take into account its ability to generate stable earnings sufficient to maintain its normal business operations.

44 IRRBB may be identified through the use of tools such as a modified duration approach, an interest rate gap and the analysis of the various risk exposures (including the BCBS Standardised Approach[19]), mainly gap risk. Once identified, LFIs should devise measurement systems that capture all material sources of IRRBB. The system should provide accurate measurements of a LFI's current levels of IRRBB risk exposure, and should be capable of identifying exposure that may arise.

45 LFIs must include an overview of their methodologies for measuring IRRBB for capital purposes and include results of any stress and scenario testing performed. As part of the process, LFIs must:

a) Document the reason for and result of the various stress tests;

b) Provide a summary of the assumptions and methodologies used in each scenario;

c) Indicate how they would manage their business and capital to ensure ongoing compliance with minimum regulatory requirements; and

d) Document and report measurement results.

46 LFIs 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:

[19] For example, the BCBS developed a standard methodology to measure the impact of adverse changes of interest rates on EVE, https://www.bis.org/bcbs/publ/d368.htm).

Assessment Criteria	Economic Value Measures	Earnings Measures
Outcomes	Compute a change in the net present value of the LFI's assets, liabilities and off-balance sheet items subject to its specific interest rate shocks and stress scenarios.	Focus on changes to future profitability within a given time horizon eventually affecting future levels of a LFI's own equity capital.
Assessment Horizons	Reflect changes in value over the remaining life of the LFI's assets, liabilities and off-balance sheet items, that is, until all positions have run off.	Only cover 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.
Future Business	Consider the net present value of repricing cash flows of instruments on the LFI's balance sheet or accounted for as an off-balance sheet item (that is a run-off view).	In addition to a run-off view, earnings measures may assume rollover of maturing items (that is, a constant balance sheet view) and/or assess the scenario-consistent impact on the LFI's future earnings inclusive of future business (that is, a dynamic view).

7.3.4.1 IRRBB Information System and Data Quality

47 The integrity and timeliness of data on current positions is also a key component of the risk measurement process. A LFI should have adequate information systems and applications for identifying, measuring, monitoring, controlling and reporting IRRBB. The system requirements include but are not limited to the following:

(a) Capture interest rate risk data on all the LFI's material IRRBB exposures including exposures to gap, basis, and option risks. This should support the LFI's measurement system to identify, measure and aggregate the major sources of IRRBB exposures;

(b) Be capable of fully and clearly recording all transactions made by the LFI, taking into account their IRRBB characteristics;

(c) Be tailored to the complexity and number of transactions creating IRRBB;

(d) Offer sufficient flexibility to accommodate a reasonable range of shocks and stress scenarios and any additional scenarios;

(e) Enable the LFI to fully measure, assess and monitor the contribution of individual transactions to its overall exposure;

(f) Be able to compute economic value and earnings-based measures of IRRBB, as well as other measures of IRRBB prescribed by the Central Bank;

(g) Be sufficiently flexible to incorporate supervisory-imposed constraints on institutions' internal risk parameter assumptions; and

(h) Have the capability to handle historical data maintenance[20] and a range of scenarios, higher tenure analysis, and granularity of data.

48 Reports must be provided on a timely basis to the LFI's board, senior management and where appropriate, individual business line managers.

49 A LFI must have transparent and verifiable processes for collecting and testing relevant data inputs to its IRRBB measurement system (for example, exposure information, details about customer behaviour and product and interest rate histories). These processes must be consistent, timely and comprehensive across the LFI. A LFI's data collection system must include processes for ensuring integrity, completeness, consistency and accuracy.

50 A LFI's IRRBB exposure data must comprehensively capture all material exposures from appropriate business activities, banking book items and geographic locations. A LFI must be able to demonstrate that any excluded exposures, both individually and in aggregate, would not have a material impact on the overall estimate of its IRRBB capital charge.

7.3.5 Principle 5: Assumptions

51 LFIs should ensure that the key behavioural and modelling assumptions underlying their measurement system are fully understood, conceptually sound, consistent with historical experience, and well documented.

[20] Granular historical data includes contractual maturity, associated optionality, early maturity dates, and other attributes, as required for behavioural modelling, et cetera.

52 LFIs should, in particular, make sound and reasonable judgments and assumptions about how an instrument's actual maturity or repricing behaviour may vary from the instrument's contractual terms because of behavioural optionality. Generally, assumptions may be made in relation to:

a) Expectations for the exercise of interest rate options (explicit and embedded) by both the LFI and its customers under specific interest rate shocks 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.

53 LFIs should carefully consider how the exercise of behavioural optionality could vary, not only under the interest rate shocks and stress scenarios but also across other dimensions. These considerations are contained in **Appendix 2**.

54 LFIs must be able to test the appropriateness of key behavioural assumptions, and all changes to the assumptions of key parameters should be documented. The most significant assumptions underlying the system should be documented and clearly understood by the board. Documentation should also include descriptions on how those assumptions could potentially affect the LFI's hedging strategies.

7.3.6 Principle 6: IRRBB Measurement Systems And Models

55 A LFI's internal measurement system for IRRBB must be conceptually sound, sufficiently comprehensive, consistently implemented and transparent, so that it captures:

a) All material sources of IRRBB across the LFI; and

b) Reliable and accurate data about exposures in a timely manner. The effectiveness and accuracy of this process must be periodically tested.

56 In addition, the LFI must:

a) Regularly monitor its IRRBB profile in terms of both earnings at risk and economic value sensitivity;

b) May choose between a variety of methodologies to quantify its IRRBB exposures under both the economic value and earnings-based measures. These can range from simple calculations based on static simulations using current holdings, to more sophisticated dynamic modelling techniques that reflect potential future business activities;

c) Inform its board of the most significant assumptions of the measurement system and how those assumptions affect any significant IRRBB hedging strategies the LFI undertakes;

d) Periodically review the assumptions made by the system, and the materiality of any IRRBB not captured by the system;

e) Perform periodical sensitivity testing of key assumptions including behavioural assumptions; and

f) Ensure that the IRRBB measurement system has comprehensive and detailed documentation, which must, at a minimum, include the specification of:

(i) Data sources and capture methods;

(ii) Calculation method and assumptions including behavioural and other assumptions about the timing of cash flows; and

(iii) The rationale for the calculation method and all assumptions.

57 When measuring IRRBB exposures, LFIs should pay special attention to the treatment of positions where behavioural maturity differs from contractual maturity and the treatment of positions denominated in different currencies. Deposits may have contractual maturities such as term deposits, or may be NMDs such as retail savings and chequing

accounts. Notwithstanding, depositors generally have the option to make withdrawals at any time. As such, changes in interest rates may affect the value of the positions, as well as the timing of cash flows in ways which may be difficult to predict.

58 Where material positions are held in different currencies, LFIs should consider the different interest rate risk exposures in each currency. LFIs may also choose to include in the risk measurement process, methods to aggregate exposures in different currencies using assumptions about the correlation between interest rates in different currencies. LFIs that use such correlation assumptions should periodically review the stability and accuracy of those assumptions and evaluate the potential risk exposures in the event such correlations break down.

59 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 board. The policy should specify the management roles and designate who is responsible for the development, implementation and use of models. An effective validation framework should include three core elements:

(i) Evaluation of conceptual/methodological soundness, including developmental evidence;

(ii) Ongoing model monitoring, including process verification and benchmarking; and

(iii) Outcomes analysis, including back testing of key internal parameters (for example, stability of deposits, prepayments, early redemptions, pricing of instruments).

7.3.7 Principle 7: Reporting

60 A LFI must regularly (at least semi-annually) report its IRRBB exposure to the board.

61 In developing an appropriate reporting framework, a LFI must consider the nature of its IRRBB exposure and the strategy adopted for managing and measuring it. Management reports prepared for the board must be produced and reviewed regularly and must at least include information on:

- (i) Summaries of the LFI's aggregate IRRBB exposures, and explanatory text that highlights the items that drive the level and direction of IRRBB;
- (ii) Reports demonstrating the LFI's compliance with policies and limits;
- (iii) Key modelling assumptions such as NMD characteristics, prepayments on fixed rate loans and currency aggregation;
- (iv) Results of stress tests, including assessment of sensitivity to key assumptions and parameters;
- (v) 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); and
- (vi) The performance of risk management strategies and the output of the LFI's risk measurement system.

62 The reviews must be conducted by management with authority to enforce, where necessary, mitigation of the LFI's exposure to IRRBB. A LFI must have in place, a process for ensuring that the board and senior management are able to respond appropriately to the information contained in management of IRRBB reports. This process must include escalation procedures for key IRRBB issues to facilitate appropriate action between formal reporting cycles. The board should review the LFI's

IRRBB management policies and procedures in light of the reports, to ensure that they remain appropriate and sound.

7.3.8 Principle 8: IRRBB Disclosure

63 The IRRBB to which LFIs are exposed, and the techniques that the institutions use to identify, measure, monitor and control those risks, are important factors that market participants consider in their assessment of an institution.

64 LFIs are required to publicly disclose information on their level of IRRBB, strategies, processes, risk reporting and measurement systems, in accordance with the Pillar 3 reporting and public disclosure provisions of the Basel framework[21]. Additionally, LFIs are required to disclose their policies for hedging and other risk mitigation and processes for monitoring the effectiveness of hedges and other mitigants. **Appendix 3** provides additional information on qualitative disclosure requirements.

7.3.9 Principle 9: Capital Adequacy for IRRBB

65 In addition to adequate systems and controls, capital has an important role to play in mitigating and supporting IRRBB. Capital should be allocated specifically to support unexpected losses created by this risk. The appropriate level of capital in support of IRRBB should be at the discretion of the LFI's board and senior management. Capital adequacy for IRBBB should be considered in relation to the risks to economic value, given that such risks are embedded in the LFI's assets, liabilities and off-balance sheet items.

66 LFIs are responsible for evaluating the appropriate capital level to hold, and for ensuring that this is sufficient to cover IRRBB and its related risks.

[21] In due course, the Central Bank will implement Pillar 3 as Phase 3 of its roadmap to implement its hybrid Basel II/III framework. In the interim, LFIs will make the disclosures as required, based on accounting standards.

The overall level of capital should be commensurate with both the LFI's actual measured level of risk (including for IRRBB) and its risk appetite, and should be duly documented in its ICAAP report, where applicable.

67 LFIs must not only rely on the supervisory assessments of capital adequacy for IRRBB or on the outcome of the supervisory outlier test (**see section 8.1**), but must develop and use their own methodologies for capital allocation, based on their risk appetite, level of risk and risk management policies. In determining the appropriate level of capital, institutions must consider both the amount and the quality of capital needed.

68 If the Central Bank concludes that a LFI's management of IRRBB is inadequate or that it has excessive risk relative to its capital or earnings, or its general risk profile, it will require the LFI to take one or more of the following actions:

(i) Strengthen its capital position;
(ii) Improve its risk management framework; and/or
(iii) Reduce its level of IRRBB exposures (for example, through hedging).

69 The reduction in IRRBB and/or the expected higher level of capital should be achieved within a specified time frame to be established, taking into consideration the prevailing financial and economic conditions, as well as the causes of the IRRBB exposure exceeding the supervisory threshold and its structural nature.

70 While, as aforementioned, this Standard applies to all LFIs, the licensees to which Basel II/III applies are required to include IRRBB in their ICAAP, under Basel's Pillar 2 requirements for assessing their overall capital adequacy in relation to their risk profile and a strategy for

maintaining their capital levels. These LFIs should consult the Central Bank's *Prudential Standard on the ICAAP*.

71 As necessary, the ICAAP should include all of the LFI's material positions and consider all relevant re-pricing and maturity data. The process should have well-documented assumptions and techniques. A LFI should be able to support its assumptions about the behavioural characteristics of non-maturing assets and liabilities, especially those exposures characterised by embedded options. Given uncertainty in such assumptions, stress testing and scenario analysis should be used in the analysis of interest rate risk.

72 Where relevant, the Central Bank will review the LFI's ICAAP report and conduct other assessments using risk-focused information to monitor the impact of potential interest rate changes on a LFI's financial performance and economic value, to be satisfied that LFIs have in place effective and appropriate arrangements for measuring, monitoring and controlling interest rate risk.

8.0 SUPERVISORY RESPONSIBILITIES

73 The Central Bank has adopted a risk-based supervisory approach which enables continuous supervision of LFIs' IRRBB through a combination of on-site examinations, off-site reviews and prudential meetings. The objective is to assess the adequacy and effectiveness of a LFI's IRRBB management process, the level and trend of the risk exposure and the adequacy of the LFI's capital relative to the size of its IRRBB exposure.

74 When reviewing a LFI's compliance with this Standard, the Central Bank will consider the following criteria:

(i) The level of inherent IRRBB at the LFI;

(ii) The complexity of a LFI's business lines, products and services; and

(iii) The size of a LFI, taking into consideration on and off-balance sheet exposures, as well as income statement metrics (such as earnings) and potential organisational structural limitations due to the institution's size.

75 As part of its Supervisory Review and Evaluation Process (SREP), the Central Bank will regularly collect sufficient and relevant information to be able to:

(i) Monitor industry trends with respect to IRRBB exposures;

(ii) Assess the soundness of LFIs' IRRBB management; and

(iii) Identify outlier LFIs (that is, LFIs with material IRRBB exposures) that will be subject to further review and/or Pillar 2 IRRBB capital add-on.

9.0 Regulatory Reporting Requirements

76 When requested, all LFIs must provide the Central Bank with comprehensive reports of the calculations of their capital needs for IRRBB exposures[22].

77 The IRRBB report should cover every major currency in which a LFI holds interest rate-sensitive positions (for example, United States Dollars, Euro, British Pound, et cetera), which is defined, for the purpose of this Standard, as each currency with material exposures (that is, those accounting for more than 5.0 per cent of either the LFI's banking book assets or liabilities).

78 The Central Bank will use the information to evaluate the LFIs' level of IRRBB based on both the earnings approach and the economic value approach. The information collected takes appropriate account of the range of maturities and currencies in each LFI's portfolio, including off

[22] The ECCB may develop and introduce a prudential return at a later date.

balance sheet items, as well as other relevant factors (for example, basis risk).

APPENDIX 1: MAIN SUB-TYPES OF IRRBB

1. **Option Risk** results from option derivative positions or from optional elements embedded in a LFI's assets, liabilities and/or off-balance sheet items, where the LFI or its customer can alter the level and timing of their cash flows. Option risk can be further characterised into:

   a) ***Automatic option risk***: this risk arises from standalone instruments, such as exchange-traded and over-the-counter option contracts (such as caps and floors) or they may be explicitly embedded within an otherwise standard financial instrument, where the option will almost certainly be exercised if it is in the holder's financial interest to do so; and

   b) ***Behavioural option risk***: this risk arises from the flexibility embedded implicitly or within the terms of financial contracts, such that changes in interest rates may affect the behaviour of the client. For example, LFIs may experience a higher proportion of fixed rate loan commitments to be drawn down when the spread increases, and vice versa.

On the deposit side, customers can generally withdraw early. Early withdrawal rights are equivalent to put options on deposits. If rates increase, the market value of customers' deposits declines and customers may withdraw them and place them with the same LFI, or a different one, at a higher rate. Another common product with behavioural optionality is non-maturity deposits, which can be withdrawn at any time without notice, but a portion of which tend to remain with the LFI in practice (that is, core deposits).

2. **Gap Risk (or Yield Curve Risk)** arises from the term structure of interest sensitive banking book instruments, and describes the risk arising from the timing of instruments' rate changes. The extent of gap risk depends on whether changes to the term structure of interest rates occur

consistently across the yield curve (parallel risk) or differentially by period (non-parallel risk).

a) ***Parallel Risk*** is fundamental to banking business and some LFIs may take on this risk in their balance sheet, as part of their strategy to improve earnings. It can, however, affect the income and economic value of a LFI as interest rates fluctuate. For example, a LFI that has funded a long-term fixed rate loan with a short-term deposit could face a decline in future income if interest rates increase. This is because the cash flows from the loan are fixed while interest payable on replacement funding will be higher after the short-term deposit matures.

b) ***Non-parallel risk*** materialises when unanticipated changes in the shape of the yield curve have adverse effects on a LFI's income or economic value. As an example, the economic value of a LFI's long position in ten-year government bonds hedged by a short position in five-year government bonds could decline sharply if the yield curve steepens, even if the position is hedged against parallel movements in the yield curve.

3. **Basis Risk** describes the impact of relative changes in interest rates for interest sensitive financial instruments that have similar tenors but are repriced using different interest rate indices which change at different times or by different amounts. As a result of these differences, interest rate changes can give rise to unexpected changes in the cash flows and earnings spread between assets, liabilities and off-balance sheet instruments of similar maturities or re-pricing frequencies.

A LFI may have mortgage loans priced at a different rate to that for its funding. The LFI has the option of increasing its prime rate but in practice, its scope to do so may depend on whether other LFs will do the same. This scenario affects the LFI's current net interest margin through changes in the spread between earnings and payments on instruments that are being repriced. It will also affect future cash flows from these instruments, which will in turn affect the economic value of the LFI.

APPENDIX 2: DIMENSIONS INFLUENCING BEHAVIOURAL OPTIONS

Products	Dimensions Influencing the Embedded Behavioural Options
Fixed rate loans subject to prepayment risk. LFIs 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 LFI's estimate of the effect of each interest rate shock and stress scenario on the average prepayment speed. Specifically, a LFImust assess the expected average prepayment speed under each scenario.	Loan size, loan-to-value ratio, borrower characteristics, contractual interest rates, seasoning[1], geographical location, original and remaining maturity, and other historical factors. Other macroeconomic variables such as unemployment rates, gross domestic product (GDP), inflation, prices in the housing market and stock indices should be considered in modelling prepayment behaviour.
Fixed rate loan commitments. LFIs may sell options to retail customers 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 to retail customers are impacted by other drivers.	Borrower characteristics, geographical location (including competitive environment and local premium conventions), customer relationship with the LFI as evidenced by cross-products, remaining maturity of the commitment, seasoning and remaining term of the mortgage.
Term deposits subject to early redemption risk. LFIs 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.	Deposit size, depositor characteristics, funding channel (for example direct or brokered deposit), contractual interest rates, seasonal factors, geographical location and competitive environment, remaining maturity and other historical factors. Other macroeconomic variables such as unemployment rates, GDP, inflation prices in the housing market and stock indices should be considered in modelling deposit redemption behaviour.
NMDs. Behavioural assumptions for deposits that have	Responsiveness of product rates to changes in market interest rates, current level of interest

[1] Seasoning is the amount of time that has passed since a loan was issued and the borrower has made regular payments on it. Generally, borrowers with a longer seasoning period and a good payment history are considered less risky and may be eligible for more favourable rates and terms than those with a shorter seasoning period or a spotty payment record.

Products	Dimensions Influencing the Embedded Behavioural Options
no specific repricing date can be a major determinant of IRRBB exposures under the economic value and earnings-based measures. LFIs should document, monitor and regularly update key assumptions for NMD balances and behaviour used in their internal measurement systems. To determine the appropriate assumptions for its NMDs, a LFI should analyse its depositor base in order to identify the proportion of core deposits (that is NMDs which are unlikely to reprice even under significant changes in interest rate environment). Assumptions should vary according to depositor characteristics (for example retail/wholesale) and account characteristics (for example, transactional/non-transactional).	rates, spread between a LFI's offer rate and market rate, competition from other firms, the LFI's geographical location and demographic and other relevant characteristics of its customer base.

APPENDIX 3: DISCLOSURES

Qualitative Disclosure

The LFI must disclose the following qualitative information:

a) A description of how they define IRRIBB for purpose of risk control and measurement.

b) A description of the institution's overall IRRBB management and mitigation strategies. Examples are: monitoring of economic value of equity (EVE) and net interest income (NII) in relation to established limits, hedging practices, conduct of stress testing, outcome analysis, the role of independent audit, the role and practices of the asset and liability management committee, the institution's practices to ensure appropriate model validation, and timely updates in response to changing market conditions.

c) The periodicity of the calculation of the institution's IRRBB measures, and a description of the specific risk measures that the institution uses to gauge its sensitivity to IRRBB, including changes to its economic value and earnings.

d) A description of the interest rate shock and stress scenarios that the institution uses to estimate changes in its economic value and in earnings.

e) A high-level description of key modelling and parametric assumptions used in calculating change in economic value of equity and change in net interest income.

f) A high-level description of how the institution hedges its IRRBB, as well as the associated accounting treatment.