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Banking Regulation & Policy Department
Bangladesh Bank
Head Office
Dhaka

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Managing Directors/Chief Executives
All Scheduled Banks in Bangladesh

Guidelines on Interest Rate Risk in the Banking Book (IRRBB)

Effective measurement and management of interest rate risk are crucial for banks to manage liabilities and assets portfolio, which are exposed to risks emanating from adverse movements in interest rates. The changes in interest rates not only impair the current and potential future earnings but may also potentially threaten the bank's solvency. To strengthen interest rate risk monitoring and measurement, Bangladesh Bank has developed Guidelines on IRRBB. Banks are advised to make adequate and reliable arrangements for the adoption of the Guidelines by- developing and formulating IRRBB policy, processes, and procedures, determining the impact of interest rates, both earnings and economic value perspective on the balance sheet structure. The use of suitable statistical tools along with other qualitative and quantitative techniques for measuring interest rate risk is necessary for allocating appropriate capital against IRRBB. Appendix and annexure at the end of these Guidelines are provided to facilitate and enhance understanding of the subject.

To facilitate the full implementation of the instructions contained in the Guidelines by June 30, 2024, banks are advised to make adequate and reliable arrangements for the experimental adoption of the Guidelines by June 30, 2021. Furthermore, banks shall report to DOS and BRPD of Bangladesh Bank in the formats prescribed in Appendix 2 and Annexure from June 30, 2021, half-yearly, on an experimental basis. Additionally, all banks must develop their own and fully implementable IRRBB model within the final implementation period, June 30, 2024.

Yours sincerely,

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GUIDELINES ON INTEREST RATE RISK IN THE BANKING BOOK

Bangladesh Bank

Guidelines on Interest Rate Risk in the Banking Book

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Foreword

The banking industry has been growing and facilitating the development of Bangladesh. For sustaining this growth, effective management of interest rate risk in the banking book (IRRBB) is crucial as the liabilities and assets portfolio of the banking industry are affected by the risks emanating from adverse movements in interest rates. The changes in interest rates not only impair the current and potential future earnings but may also potentially threaten the bank's capital base. Hence, for managing the IRRBB issue, Bangladesh Bank has prepared this guidelines on "Guidelines on interest rate risk in the banking book (IRRBB)" in line with international best practices as per the Basel Core Principles (BCPs) for Effective Banking Supervision 2012.

The Guidelines on IRRBB set out the requirements and supervisory perspective of Bangladesh Bank to ensure that banks have adequate policies and processes in place to identify, measure, evaluate, monitor, report, and mitigate IRRBB. As excessive IRRBB can pose a significant threat to a bank's current capital base and/or future earnings if it is not managed appropriately, this guidelines will make the overall risk management of banks more appropriate and efficient.

We believe this guideline is an important key step towards achieving bank-led robust economic growth by strengthening interest rate risk monitoring and measurement.

Abu Farah Md. Nasser
Deputy Governor
Bangladesh Bank

1. Introduction

1.1 The guidelines, titled "Guidelines on Interest Rate Risk in the Banking Book (IRRBB)" issued by Bangladesh Bank (BB) are applicable in the computation of IRRBB for all the commercial banks including Islamic banks (Profit Rate Risk in the Banking Book) operating in Bangladesh. This guidelines are issued under section 45 of the Banking Company Act, 1991 by following Principle 23 of Core Principles for Effective Banking Supervision 2012 of the Bank for International Settlements (BIS) and supervisory review process 'SRP31 Interest rate risk in the banking book' (December 2019) of the Basel Committee on Banking Supervision (BCBS). It aligned international best practices as well as concerned circulars and circular letters, the Guidelines on Stress Testing of 2010, the Guidelines on Risk Based Capital Adequacy of 2014, and Risk Management Guidelines for Banks of 2018 of BB. Islamic banks, i.e., Shari'ah based banks, due to their different business model, are expected to follow the instructions of section 12 of the guidelines.

1.2 Interest rate risk in the banking book (IRRBB) refers to the current or potential risk to the bank's capital and earnings arising from adverse movements in interest rates that affect the bank's banking book positions. 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. 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 it is not managed appropriately.

1.3 Three main sub-types of IRRBB are gap risk, basis risk, and option risk.

(1) Gap risk arises from the term structure of 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).

(2) Basis risk describes the impact of relative changes in interest rates for financial instruments that have similar tenors but are priced using different interest rate indices.

(3) 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. Option risk can be further characterized by automatic option risk and behavioral option risk.

1.4 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 exposures in a way, or at a time, that can adversely affect a bank's financial condition. While the three sub-types listed above are directly linked to IRRBB, credit spread risk in the banking book (CSRBB) is a related risk that banks need to monitor and assess in their interest rate risk management framework. CSRBB refers to any kind of asset/liability spread risk of credit-risky instruments that is not explained by IRRBB and by the expected credit/jump to default risk.

2. Identification and monitoring of IRRBB

2.1 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). Besides, there are optionalities embedded in many of the common banking products (e.g., non-maturity deposits, term deposits, fixed rate loans) that are triggered by changes in interest rates.

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

2.3 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.

2.4 Products and activities that are new to a bank must undergo a careful pre-acquisition review to ensure that the IRRBB characteristics are well understood and subject to a predetermined test phase before being fully rolled out. 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 shall be integrated within its broader risk management framework and aligned with its business planning and budgeting activities.

2.5 In identifying, measuring, monitoring, and controlling IRRBB, banks shall also ensure that CSRBB is properly monitored and assessed.

3. IRRBB management framework

3.1 The board of directors (hereafter, board) has responsibility for understanding the nature and the level of the bank's IRRBB exposures. The board shall approve broad business strategies as well as overall policies concerning IRRBB. It shall ensure that there is clear guidance regarding the acceptable level of IRRBB, given the bank's business strategies.

3.2 Accordingly, the board 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 board is responsible for setting:

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

(2) adequate systems and standards for measuring IRRBB;

(3) 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;

(4) a comprehensive IRRBB reporting and review process; and

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

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

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

3.5 The board may delegate the task for developing IRRBB policies and practices to the asset and liability management committee (ALCO). The ALCO shall meet regularly and include representatives from concerned departments managing exposures connected to IRRBB.

3.6 The board shall clearly identify responsibilities for managing IRRBB and, to avoid potential conflicts of interest, shall ensure that there is adequate separation of responsibilities in key elements of the risk management process. Banks shall have IRRBB identification, measurement, monitoring, and control functions with clearly defined responsibilities that are satisfactorily independent of risk-taking functions of the bank and that report directly to the board.

3.7 The board shall ensure that the bank's organizational structure enables ALCO to carry out its responsibilities and facilitates effective decision-making and good governance. The board shall encourage discussions between its members and ALCO regarding the IRRBB management process. The risk management division of the bank shall also regularly communicate and work closely with ALCO to facilitate evaluations of risk arising from future business.

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

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

3.10 In addition, banks shall have in place regular evaluations and reviews of their internal control system and risk management processes carried out by the Risk Management Division.

3.11 Banks shall have their IRRBB identification, measurement, monitoring, and control processes reviewed by an independent auditing function (such as an internal or external auditor)

regularly. In such cases, reports written by internal/external auditors or other equivalent external parties (such as consultants) shall be made available to BB on demand.

4. IRRBB risk appetite

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

4.2 Policy limits set by the board shall be consistent with the bank's overall approach for measuring IRRBB. Aggregate risk limits, clearly articulating the amount of IRRBB acceptable to the board, shall be applied on a solo as well as a consolidated basis. 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 shall represent meaningful shock and stress situations, considering historical interest rate volatility and the time required by management to mitigate those risk exposures.

4.3 Policy limits shall 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 shall 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 shall establish risk tolerances appropriate for these risks.

4.4 The board shall approve risk-taking initiatives in advance of implementation. Proposals to use new strategies shall be assessed to ensure that the resources required to establish sound and effective IRRBB management of the product or activity have been identified, that the proposed activities are in line with the bank's overall risk appetite, and procedures to identify, measure, monitor and control the risks of the proposed product or activity have been established.

4.5 There shall be systems in place to ensure that positions that exceed, or are likely to exceed, limits defined by the board or its delegates shall receive prompt management attention and be escalated without delay. There shall 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.

5. IRRBB measurement

5.1 Banks' internal measurement systems (IMS) shall 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 shall consider its ability to generate stable earnings sufficient to maintain its normal business operations.

5.2 Banks shall pay attention to the complementary nature of economic value and earnings-based measures in their risk and internal capital adequacy assessments. If a bank solely minimizes its economic value risk by matching the repricing of its assets with liabilities beyond the short term, it could run the risk of earnings volatility.

5.3 Banks' IMS for IRRBB shall be able to accommodate the calculation of the impact on economic value (ΔEVE) and net interest income earnings (ΔNII) of multiple scenarios, based on:

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

(2) historical and hypothetical interest rate stress scenarios, which tend to be more severe than shock scenarios;

(3) the six prescribed interest rate shock scenarios set out in Appendix 1; and

(4) any additional interest rate shock scenarios required by BB from time to time.

5.4 Banks shall 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.

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

5.6 A bank's stress testing framework for IRRBB shall be commensurate with its nature, size, and complexity as well as business activities and overall risk profile. The framework shall include clearly defined objectives, scenarios tailored to the bank's businesses and risks, well-documented assumptions, and sound methodologies. The framework will be used to assess the potential impact of the scenarios on the bank's financial condition, enable ongoing and effective review processes for stress tests, and recommend actions based on the stress test results. IRRBB stress tests shall play an important role in the communication of risks, both within the bank and externally with BB and the market through appropriate disclosures.

5.7 The identification of relevant shock and stress scenarios for IRRBB, the application of sound modeling approaches, and the appropriate use of the stress testing results require the collaboration of different experts within a bank (e.g., the treasury department, the finance department, the ALCO, the risk management division and/or the bank's economists). A stress-testing program for IRRBB shall ensure that the opinions of the experts are considered.

5.8 Banks shall determine, by currency, a range of potential interest rate movements against which they will measure their IRRBB exposures. Management shall ensure that risk is measured under a reasonable range of potential interest rate scenarios, including some containing severe stress elements. In developing the scenarios, banks shall consider a variety of factors, such as the shape and level of the current term structure of interest rates and the historical and implied

volatility of interest rates. In low-interest rate environments, banks shall also consider negative interest rate scenarios and the possibility of asymmetrical effects of negative interest rates on their assets and liabilities.

5.9 A bank shall consider the nature and sources of its IRRBB exposures, the time it would need to take action to reduce or unwind unfavorable IRRBB exposures, and its capability/willingness to withstand accounting losses to reposition its risk profile. A bank shall select scenarios that provide meaningful estimates of risk and include a range of shocks that is sufficiently wide to allow the board to understand the risk inherent in the bank's products and activities. When developing interest rate shock and stress scenarios for IRRBB, banks shall consider the following:

(1) The scenarios shall be sufficiently wide-ranging to identify parallel and non-parallel gap risk, basis risk, and option risk. In many cases, static interest rate shocks may be insufficient to assess IRRBB exposure adequately. Banks shall ensure that the scenarios are both severe and plausible, considering the existing level of interest rates and the interest rate cycle.

(2) Special consideration shall be given to instruments or markets where concentrations exist, because those positions may be more difficult to liquidate or offset in a stressful market environment.

(3) Banks shall assess the possible interaction of IRRBB with its related risks, as well as other risks (e.g., credit risk, liquidity risk).

(4) Banks shall assess the effect of adverse changes in the spreads of new assets/liabilities replacing those assets/liabilities maturing over the horizon of the forecast on their NII.

(5) Banks with significant option risk shall include scenarios that capture the exercise of such options. Given that the market value of options also fluctuates with changes in the volatility of interest rates, banks shall develop interest rate assumptions to measure their IRRBB exposures to changes in interest rate volatilities.

(6) Banks shall specify, in building their interest rate shock and stress scenarios, the term structure of interest rates that will be incorporated and the relationship between yield curves, rate indices, etc. Banks shall also estimate how interest rates that are administered or managed by management (e.g., prime rates or retail deposit rates, as opposed to those that are purely market-driven) might change. Management shall document how these assumptions are derived.

5.10 Banks shall perform qualitative and quantitative reverse stress tests to identify interest rate scenarios that could severely threaten a bank's capital and earnings; and reveal vulnerabilities arising from its hedging strategies and the potential behavioral reactions of its customers.

6. Behavioural and modeling assumptions

6.1 Both economic value and earnings-based measures of IRRBB are significantly impacted by several assumptions made for risk quantification, namely:

(1) 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;
(2) treatment of balances and interest flows arising from non-maturity deposits (NMDs);
(3) treatment of own equity in economic value measures; and
(4) the implications of accounting practices for IRRBB.

6.2 Common products with behavioral optionalities include:

(1) Fixed rate loans subject to prepayment risk – Banks shall 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 shall be documented. Several factors 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.

(2) Fixed rate loan commitments – Banks may enter into commitments with retail customers whereby, for a limited period, the customers can choose to draw down a loan at a committed rate. Unlike loan commitments to corporate, where drawdowns strongly reflect characteristics of automatic interest rate options, mortgage commitments (i.e., pipelines) to retail customers are impacted by other drivers.

(3) 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 periods to modify the speed of redemption. The classification scheme shall 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.

(4) 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 shall document, monitor, and regularly update key assumptions for NMD balances and behavior used in their IMS. To determine the appropriate assumptions for its NMDs, a bank shall analyze its depositor base to identify the proportion of core deposits (i.e., NMDs which are unlikely to reprice even under significant changes in interest rate environment). Assumptions shall vary according to depositor characteristics (e.g., retail/wholesale) and account characteristics (e.g., transactional/non-transactional).

6.3 Modelling assumptions shall be conceptually sound and reasonable, and consistent with historical experience. Banks must carefully consider how the exercise of the behavioral

optionality will vary not only under the interest rate shock and stress scenario but also across other dimensions. For instance, considerations may include those set out in Table 1.

Table 1: Considerations affecting behavioral optionality

Product	**Dimensions influencing the exercise of the embedded behavioral options**
Fixed rate loans subject to prepayment risk	Loan size, loan-to-value ratio (LTV), borrower characteristics, contractual interest rates, seasoning, geographical location, original and remaining maturity, and other historical factors. Other macroeconomic variables such as stock indices, unemployment rates, gross domestic product (GDP), and inflation and housing price indices shall be considered in modeling prepayment behavior.
Fixed rate loan commitments	Borrower characteristics, geographical location (including competitive environment and local premium conventions), customer relationship with the bank as evidenced by cross-products, a remaining maturity of the commitment, seasoning, and remaining term of the mortgage.
Term deposits subject to early redemption risk	Deposit size, depositor characteristics, funding channel (e.g., direct or wholesale deposit), contractual interest rates, seasonal factors, geographical location and competitive environment, remaining maturity, and other historical factors. Other macroeconomic variables such as stock indices, unemployment rates, GDP, inflation, and housing price indices shall be considered in modeling deposit redemption behavior.
NMDs	Responsiveness of product rates to changes in market interest rates, the current level of interest rates, spread between a bank's offer rate and market rate, competition from other firms, the bank's geographical location and demographic, and other relevant characteristics of its customer base.

6.4 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. Banks with the necessary skills and sophistication, and with material multicurrency exposures, may choose to include, in their IMS, methods to aggregate their IRRBB in different currencies using assumptions about the correlation between interest rates in different currencies.

6.5 Further, banks shall consider the materiality of the impact of behavioral optionalities within floating rate loans. For instance, the behavior of prepayments arising from embedded caps and floors could impact the banks' economic value of equity.

6.6 Banks shall be able to test the appropriateness of key behavioral assumptions, and all changes to the assumptions of key parameters shall be documented (e.g., by comparing the economic value of equity measured under their IMS with the standardized framework in Appendix 1). Banks shall periodically perform sensitivity analyses for key assumptions to monitor their impact on measured IRRBB. Sensitivity analyses shall be performed regarding both economic value and earnings-based measures.

6.7 The most significant assumptions underlying the system shall be documented and clearly understood by the board. Documentation shall also include descriptions of how those assumptions could potentially affect the bank's hedging strategies.

6.8 As market conditions, competitive environments, and strategies change over time, the bank shall 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.

7. Data integrity and model governance

7.1 Accurate and timely measurement of IRRBB is necessary for effective risk management and control. A bank's risk measurement system shall 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 shall guide management's selection of the most appropriate form of measurement system.

7.2 Banks shall 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 shall use a variety of methodologies to quantify their IRRBB exposures under both the economic value and earnings-based measures, ranging from simple calculations based on static simulations using current holdings to more sophisticated dynamic modeling techniques that reflect potential future business activities.

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

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

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

7.6 Banks' IMS shall be able to compute the economic value and earnings-based measures of IRRBB, as well as other measures of IRRBB prescribed by BB, based on the interest rate shock and stress scenarios set out in Appendix 1. It shall also be sufficiently flexible to incorporate BB-imposed constraints on banks' internal risk parameter estimates.

7.7 The validation of IRRBB measurement methods and assessment of corresponding model risk shall be included in a formal policy process that shall be reviewed and approved by the board or its delegates. The policy shall specify the management roles and designate who is responsible for the development, implementation, and use of models. Besides, 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.

7.8 An effective validation framework shall include three core elements:
(1) evaluation of conceptual/methodological soundness, including developmental evidence;
(2) ongoing model monitoring, including process verification and benchmarking; and
(3) outcomes analysis, including backtesting of key internal parameters (e.g., stability of deposits, prepayments, early redemptions, pricing of instruments).

7.9 In addressing the expected initial and ongoing validation activities, the policy shall establish a hierarchical process for determining model risk soundness based on both quantitative and qualitative dimensions such as size, impact, past performance, and familiarity with the modeling technique employed.

7.10 Model risk management for IRRBB measures shall follow a holistic approach that begins with motivation, development, and implementation by model owners and users. Before receiving authorization for usage, the process for determining model inputs, assumptions, modeling methodologies, and outputs shall be reviewed and validated independently of the development of IRRBB models. The review and validation results and any recommendations on model usage shall be presented to and approved by the board. Upon approval, the model shall be subject to ongoing review, process verification, and validation at a frequency that is consistent with the level of model risk determined and approved by the bank.

7.11 The ongoing validation process shall establish a set of exception trigger events that obligate the model reviewers to notify the board in a timely fashion, to determine corrective actions and/or restrictions on model usage.

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

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

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

8. Reporting to management

8.1 The reporting of risk measures to the board shall be regular and shall compare current exposure with policy limits. Reporting shall 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 modeling shortcomings regularly. Portfolios that may be subject to significant mark-to-market movements shall be identified within the bank's MIS and subject to oversight in line with any other portfolios exposed to market risk.

8.2 While the types of reports prepared for the board will vary based on the bank's portfolio composition, they shall include at least the following:

(1) 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;

(2) reports demonstrating the bank's compliance with policies and limits;

(3) key modeling assumptions such as NMD characteristics, prepayments on fixed rate loans, and currency aggregation;

(4) results of stress tests, including assessment of sensitivity to key assumptions and parameters; and

(5) 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).

8.3 Reports detailing the bank's IRRBB exposures shall be provided to the bank's board on a timely basis and reviewed regularly. The IRRBB reports shall provide aggregate information as well as sufficient supporting detail to enable the board to assess the sensitivity of the bank to changes in market conditions, regarding portfolios that may potentially be subject to significant mark-to-market movements. The board shall review the bank's IRRBB management policies and procedures considering the reports, to ensure that they remain appropriate and sound.

9. Disclosure

9.1 Banks shall disclose the measured ΔEVE and ΔNII under the prescribed interest rate shock scenarios set out in Appendix 1. Disclosure shall be in the formats given in Appendix 2. Furthermore, the formats of Appendix 2 and Annexure should be submitted to both Department of Off-site Supervision (DOS) and Banking Regulation and Policy Department (BRPD) of BB.

10. IRRBB in the ICAAP

10.1 Banks are responsible for evaluating the level of capital that they shall hold, and for ensuring that this is sufficient to cover IRRBB and its related risks. The contribution of IRRBB to the overall internal capital assessment shall be based on the bank's IMS outputs, taking account of key assumptions and risk limits. The overall level of capital shall be commensurate with both the bank's actual measured level of risk (including for IRRBB) and its risk appetite and be duly documented in its ICAAP report.

10.2 Banks shall not only rely on BB's assessments of capital adequacy for IRRBB but shall also develop their methodologies for capital allocation, based on their risk appetite. In determining the appropriate level of capital, banks shall consider both the amount and the quality of capital needed.

10.3 Capital adequacy for IRBBB shall be considered in relation to the risks to economic value, given that such risks are embedded in the bank's assets, liabilities, and off-balance sheet items. For risks to future earnings, given the possibility that future earnings may be lower than expected, banks shall consider capital buffers.

10.4 Capital adequacy assessments for IRRBB shall factor in:

(1) the size and tenor of internal limits on IRRBB exposures, and whether these limits are reached at the point of capital calculation;

(2) the effectiveness and expected cost of hedging open positions that are intended to take advantage of internal expectations of the future level of interest rates;

(3) the sensitivity of the internal measures of IRRBB to key modeling assumptions;

(4) the impact of shock and stress scenarios on positions priced off different interest rate indices (basis risk);

(5) the impact on economic value and NII of mismatched positions in different currencies;

(6) the impact of embedded losses;

(7) the distribution of capital relative to risks across legal entities that form part of a capital consolidation group, in addition to the adequacy of overall capital on a consolidated basis;

(8) the drivers of the underlying risk; and

(9) the circumstances under which the risk might crystallize.

10.5 The outcomes of the capital adequacy for IRRBB shall be considered in a bank's ICAAP and flow through to assessments of capital associated with business lines.

11. Assessment of banks' IRRBB exposures and management by BB

11.1 Banks shall, on a regular basis, provide sufficient information to BB by assessing their IRRBB exposures. The amount of information provided shall allow BB to assess the IRRBB exposures of the bank.

11.2 BB may collect additional information to assess banks' IRRBB including the sensitivity of their IMS calculations to changes in key assumptions. For example, BB may collect information on:

(1) the modeling of NMDs for IMS purposes and the sensitivity of a bank's economic value and earnings to changes in NMD assumptions;

(2) the impact of assumptions used regarding products with behavioral optionalities;

(3) the treatment of own equity in internal calculations and the extent to which this impacts the change in the economic value of equity (EVE) number disclosed;

(4) repricing gaps of cash flows associated with their interest rate-sensitive assets, liabilities, and off-balance sheet items (by significant currencies);

(5) exposures to automatic interest rate options;
(6) the types of yield curve used for IMS purposes;
(7) the level of EVE if calculated using the standardized framework set out in Appendix 1; and
(8) economic value and earnings-based measures for interest rate shock and stress scenarios in addition to those prescribed in Appendix 1 (including results based on banks' internally developed or other interest rate shock or stress scenarios).

11.3 BB will evaluate the adequacy, integrity, and effectiveness of a bank's IRRBB management framework and assess whether its practices comply with the stated objectives and risk tolerances set by its governing body.

11.4 BB will evaluate whether a bank's IMS provides a sufficient basis for identifying and measuring IRRBB, taking note particularly of the key assumptions that affect the measurement of IRRBB. BB may request and evaluate information about the significant model or policy changes that have occurred between their regular reviews and concentrate their efforts on reviewing the most material models and policies.

11.5 BB will regularly review the outputs from the bank's IMS, including the bank's IRRBB exposures (both economic value and earnings-based measures) based on the internal calculations using at least the prescribed interest rate shock scenarios specified in Appendix 1, as well as any additional interest rate shock and stress scenarios determined by BB.

11.6 BB will assess the adequacy of a bank's capital relative to its IRRBB exposures to determine whether the bank requires more detailed examination and shall potentially be subject to additional capital requirements and/or other mitigation actions.

12. Islamic banks, i.e., Shari'ah based banks

12.1 Shari'ah based banks must be able to distinguish the different nature and combination of risks that are embedded within different types of Shariah contracts used to structure financial products. A robust and dynamic risk assessment approach is required for products that involve different types of Shariah contracts throughout the life of the product. It must establish comprehensive risk management and reporting process to assess the potential impacts of market factors affecting profits on assets in comparison to profits paid on its liabilities.

12.2 Profit rate risk or rate of return risk of Islamic banks generally associated with overall balance sheet exposures where mismatches arise between assets and balances from fund providers. Since Islamic bank`s responsibility is to manage their investment accounts holder`s (IAHs) expectations and their liabilities to current account holders, the rate of return risk is a strategic risk issue forming part of Islamic bank`s balance sheet risk management. An increase in benchmark rates may result in IAHs having expectations of a higher rate of return. Changes in the expected rate of return may trigger the transfer of funds from the bank to other banks. The rate of return risk differs from interest rate risk in that Islamic banks managing Shari'a-compliant

products are concerned with the result of their investment activities at the end of the investment holding period. Such results cannot be pre-determined exactly.

12.3 A consequence of rate of return risk may be displaced commercial risk derives from competitive pressures on Shari'ah based banks to attract and retain investors (fund providers). Shari'ah based banks may be under market pressure to pay a profit that exceeds the rate that has been earned on assets when the return on assets is under-performing as compared with its competitors. Shari'ah based banks may decide to forgo their part of profits to satisfy and retain their fund providers and dissuade them from withdrawing their funds. The decision needs to be taken with clear and well-defined Shari'ah compliant policies approved by the board.

12.4 A Profit Equalisation Reserve (PER) is the amount appropriated by Islamic banks out of their gross income, before allocating the Mudarib share, to maintain a certain level of return on investment and increase owners' equity. The basis for computing the amounts to be so appropriated shall be predefined and applied per the contractual conditions accepted by the IAHs and after formal review and approval by the board.

12.5 An Investment Risk Reserve (IRR) is the amount appropriated by Islamic banks out of the income of IAHs, after allocating the Mudarib share, to cushion the effects of the risk of future investment losses on IAHs. The terms and conditions whereby IRR can be set aside and utilized shall be determined and approved by the board.

12.6 Islamic banks must take necessary steps to ensure that the management processes relating to the identification, measurement, monitoring, reporting, and control of the rate of return risk (including appropriate structure) are in place.

12.7 Islamic banks must assess the effect of the level of their dependency on current account holders' funds. Although no returns are expected by current account holders, the sudden withdrawal of these funds would have an adverse impact on the overall potential rate of return for Islamic banks.

12.8 When calculating a rate of return, Islamic banks must employ a gapping method for allocating positions into time bands with remaining maturities or re-pricing dates, whichever is earlier.

12.9 Actual cash flows may indicate a gap for a given time band, affecting the rate of return for that period. Depending on the complexity and the nature of their business operations, Shari'ah based banks may employ techniques ranging from simple gap to advance simulation or dynamic approaches to assess future cash flow variability and net income. The estimates derived from selected approaches may provide acceptable approximations of periodic future earnings' variability; hence, the outcomes will yield different levels of expected returns to IAHs.

12.10 The measurement of the rate of return risk highlights the importance of cash flow forecasting for instruments and contracts where Islamic banks are required to simulate and assess their behavioral maturity, underlying assumptions, and parameters, which must be reviewed periodically for reliability. The materiality of potential threats to future earnings and the

usefulness of the resulting information must be considered in determining the type and extent of forecasted behavior for Shari'ah based banks.

12.11 In assessing whether a potential threat is likely to have a material, likely and imminent impact on a balance sheet position, Islamic banks must ensure that they understand the different characteristics of their balance sheet positions in the different currencies and the prevailing regulations.

12.12 In assessing exposure to rate of return risks, Shari'ah based banks must consider the non-contractual behavioral maturity of the transactions in the context of the environment in which they operate and changing market conditions.

13. Outlier banks

13.1 If any bank's maximum ΔEVE, under the six prescribed interest rate shock scenarios as reported under table 2 of Appendix 1 is equal to or more than 15% of its Tier 1 capital (materially high IRRBB), it will be considered as outlier banks. BB may ask these banks to either reduce their exposure to IRRBB or enhance their capital base.

Appendix 1

14. The standardized interest rate shock scenarios

14.1 Banks shall apply six prescribed interest rate shock scenarios to capture parallel and non-parallel gap risks for EVE and two prescribed interest rate shock scenarios for NII. These scenarios are applied to IRRBB exposures in each currency for which the bank has material positions (equals or more than 5% of the banking book assets or liabilities). IRRBB is measured employing the following six scenarios:

(1) parallel shock up;
(2) parallel shock down;
(3) steepener shock (short rates down and long rates up);
(4) flattener shock (short rates up and long rates down);
(5) short rates shock up; and
(6) short rates shock down.

Table 2: Specified size of interest rate shocks, $\overline{R}_{\text{shocktype, c}}$

Shock	**USD**	**BDT***
Parallel	200	400
Short	300	500
Long	150	300

* The shocks for BDT will be determined from time to time by Bangladesh Bank

14.2 Given the above table, the instantaneous shocks to the risk-free rate for parallel, shorts, and long, for each currency, the following parameterizations of the six interest rate shock scenarios shall be applied:

(i) Parallel shock for currency c: a constant parallel shock up or down across each time buckets.

$$\Delta R_{parallel,c}(t_k) = \pm \bar{R}_{parallel,c}$$

(ii) Short rate shock for currency c: shock up or down that is greatest at the shortest tenor midpoint. That shock, through the shaping scalar $S_{short}(t_k) = (e^{\frac{-t_k}{x}})$, where x=4, diminishes towards zero at the tenor of the longest point in the term structure.

$$\Delta R_{short,c}(t_k) = \pm \bar{R}_{short,c}. S_{short}(t_k) = \pm \bar{R}_{short,c} . (e^{\frac{-t_k}{x}})$$

(iii) Long rate shock for currency c (note: this is used only in the rotational shocks): Here the shock is greatest at the longest tenor midpoint and is related to the short scaling factor as

$$S_{long}(t_k) = 1 - S_{short}(t_k)$$

$$\Delta R_{long,c}(t_k) = \pm \bar{R}_{long,c}. S_{long}(t_k) = \pm \bar{R}_{long,c} . (1 - e^{\frac{-t_k}{x}})$$

(iv) Rotation shocks for currency c: involving rotations to the term structure (i.e., steepeners and flatteners) of the interest rates whereby both the long and short rates are shocked and the shift in interest rates at each tenor midpoint is obtained by applying the following formulas to those shocks:

$$\Delta R_{steepener,c}(t_k) = -0.65 \,.\, \left|\Delta R_{short,c}(t_k)\right| + 0.9 \,.\, \left|\Delta R_{long,c}(t_k)\right|$$

$$\Delta R_{flattener,c}(t_k) = +0.8 \,.\, \left|\Delta R_{short,c}(t_k)\right| - 0.6 \,.\, \left|\Delta R_{long,c}(t_k)\right|$$

Examples:

Short rate shock: Assume that a bank uses the framework with K=19 time bands and with t_K=25 years (the midpoint (in time) of the longest tenor bucket K), and where t_k is the midpoint (in time) for bucket k. In the standardized framework, if k=10 with t_k=3.5 years (see table 3), the scalar adjustment for the short shock would be $S_{short}(t_k) = \left(e^{\frac{-3.5}{4}}\right) = 0.417$. Banks would multiply this by the value of the short rate shock to obtain the amount to be added to or subtracted from the yield curve at that tenor point. If the short rate shock were +500 bp (as for the BDT), the increase in the yield curve at t_k =3.5 years would be 208.5bp.

Steepener: Assume the same point on the yield curve as above, t_k =3.5 years. If the absolute value of the short rate shock were 500 bp and the absolute value of the long rate shock was 300 bp (as for the BDT), the change in the yield curve at t_k=3.5 years would be the sum of the effect of the short rate shock plus the effect of the long rate shock in basis points: - 0.65 · 500bp · 0.417 + 0.9 · 300bp · (1 - 0.417) =21.89bp.

Flattener: The corresponding change in the yield curve for the shocks in the example above at t_k=3.5 years would be: + 0.8 · 500bp · 0.417 - 0.6 · 300bp · (1 - 0.417) = 61.86bp.

15. The standardized framework

15.1 The steps involved in measuring a bank's IRRBB from data formats in Annexure, based solely on EVE, are:

(1) Interest rate-sensitive banking book positions are allocated to one of three categories (i.e., amenable, less amenable, and not amenable to standardization).

(2) Determination of slotting of cash flows based on repricing maturities. This is a straightforward translation for positions amenable to standardization. For positions less amenable to standardization, they are excluded from this step. For positions with embedded automatic interest rate options, the optionality shall be ignored for slotting of notional repricing cash flows. For positions that are not amenable to standardization, there is a separate treatment for:

(a) NMDs – according to the separation of core and non-core cash flows

(b) Behavioural options (fixed rate loans subject to prepayment risk and term deposits subject to early redemption risk) – behavioral parameters relevant to the position type must rely on a scenario-dependent look-up table 5.

3) Determination of ΔEVE for relevant interest rate shock scenarios for each currency. The ΔEVE is measured per currency for all six prescribed interest rate shock scenarios.

(4) Add-ons for changes in the value of automatic interest rate options (whether explicit or embedded) are added to the EVE changes. Automatic interest rate options sold are subject to full revaluation (possibly net of automatic interest rate options bought to hedge sold interest rate options) under each of the six prescribed interest rate shock scenarios for each currency. Changes in values of options are then added to the changes in the EVE measure under each interest rate shock scenario on a per currency basis.

(5) IRRBB EVE calculation. The ΔEVE under the standardized framework will be the maximum of the worst aggregated reductions to EVE across the six prescribed interest rate shocks.

15.2 Banks must project all future notional repricing cash flows arising from interest rate-sensitive assets, liabilities, and off-balance sheet items on to:

(1) 19 predefined time buckets (indexed numerically by k) as set out in Table 3, into which they fall according to their repricing dates, or

(2) the time bucket midpoints as set out in Table 3, retaining the notional repricing cash flows' maturity. This alternative requires splitting up notional repricing cash flows between two adjacent maturity bucket midpoints.

Table 3: Maturity schedule with 19-time buckets for notional repricing cash flows at t^{CF}

Time bucket intervals (On=Overnight; M = months; Y = years)**								
Short term rates	On (0.0028Y)	On to1M (0.0417Y)	1M to 3M (0.1667Y)	3M to 6M (0.375Y)	6M to9M (0.625Y)	9M to1Y (0.875Y)	1Y to1.5Y (1.25Y)	1.5Yto2Y (1.75Y)
Medium term rates	2Y to 3Y (2.5Y)	3Y to 4Y (3.5Y)	4Y to 5Y (4.5Y)	5Y to 6Y (5.5Y)	6Y to 7Y (6.5Y)			
Long term rates	7Y to8Y (7.5Y)	8Y to9Y (8.5Y)	9Y to10Y (9.5Y)	10Y to 15Y (12.5Y)	15Yto20Y (17.5Y)	t^{CF}>20Y (25Y)		

**The number in brackets is the time bucket's midpoint.

15.3 For this approach, assets are those not deducted from CET1 capital and exclude fixed assets (such as real estate or intangible assets) and equity exposures in the banking book. Liabilities include all non-remunerated deposits but exclude CET1 capital under the Basel III framework.

15.4 A notional repricing cash flow CF(k) is defined as:

(1) any repayment of principal (e.g., at contractual maturity);

(2) any repricing of principal; repricing is said to occur at the earliest date at which either the bank or its counterparty is entitled to unilaterally change the interest rate, or at which the rate on a floating rate instrument changes automatically in response to a change in an external benchmark; or

(3) any interest payment on a tranche of principal that has not yet been repaid or repriced; spread components of interest payments on a tranche of principal that has not yet been repaid and which do not reprice must be slotted until their contractual maturity irrespective of whether the non-amortized principal has been repriced or not.

15.5 The date of each repayment, repricing, or interest payment is referred to as its repricing date.

15.6 Banks have the choice of whether to deduct commercial margins and other spread components from the notional repricing cash flows, using a prudent and transparent methodology.

15.7 Floating rate instruments are assumed to reprice fully at the first reset date. Hence, the entire principal amount is slotted into the bucket in which that date falls, with no additional slotting of notional repricing cash flows to later time buckets or time bucket midpoints (other than the spread component which is not repriced).

15.8 All notional repricing cash flows associated with interest rate-sensitive assets, liabilities, and off-balance sheet items, for each currency, are allocated to the prescribed time buckets or time bucket midpoints (henceforth, denoted by $CF_{i,c}(k)$ or $CF_{i,c}(t_k)$ under interest rate shock scenario i and currency c) based on their amenability to standardization.

15.9 Notional repricing cash flows can be slotted into appropriate time buckets or time bucket midpoints based on their contractual maturity, if subject to fixed coupons, or into the next repricing period if coupons are floating. Positions amenable to standardization fall into two categories:

(1) Fixed rate positions: such positions generate cash flows that are certain till the point of contractual maturity. Examples are fixed rate loans without embedded prepayment options, term deposits without redemption risk, and other amortizing products such as mortgage loans. All coupon cash flows and periodic or final principal repayments shall be allocated to the time bucket midpoints closest to the contractual maturity.

(2) Floating rate positions: such positions generate cash flows that are not predictable past the next repricing date other than that the present value would be reset to par. Accordingly, such instruments can be treated as a series of coupon payments until the next repricing and a par notional cash flow at the time bucket midpoint closest to the next reset date bucket.

15.10 Positions amenable to standardization include positions with embedded automatic interest rate options where the optionality (whether sold or bought) shall be ignored for slotting of notional repricing cash flows.

15.11 Positions not amenable to standardization include:
(1) NMDs,
(2) fixed rate loans subject to prepayment risk and
(3) term deposits subject to early redemption risk.

15.12 Under the standardized framework, banks shall first separate their NMDs according to the nature of the deposit and depositor. Banks shall then identify, for each category, the core, and non-core deposits, up to the limits specified in Table 4. Finally, banks shall determine an appropriate cash flow slotting for each category, following the average maturity limits specified in Table 4.

15.13 NMDs must be segmented into retail and wholesale categories. Retail deposits are defined as deposits placed with a bank by a person. Deposits made by small business customers and managed as retail exposures are considered as having similar interest rate risk characteristics to retail accounts and thus can be treated as retail deposits (provided the total aggregated liabilities raised from one small business customer are less than 10 crores BDT). Retail deposits shall be considered as held in a transactional account when regular transactions are carried out in that account (e.g., when salaries are regularly credited) or when the deposit is non-interest bearing. Other retail deposits shall be considered as held in a non-transactional account. Deposits from legal entities, sole proprietorships, or partnerships are captured in wholesale deposit categories.

15.14 Banks shall distinguish between the stable and the non-stable parts of each NMD category using observed volume changes over the past 10 years. The stable NMD portion is the portion that is found to remain undrawn with a high degree of likelihood. Core deposits are the proportion of stable NMDs which are unlikely to reprice even under significant changes in the interest rate environment. The remainder constitutes non-core NMDs.

15.15 Banks are required to estimate their level of core deposits using this two-step procedure for each deposit category, and then to aggregate the results to determine the overall volume of core deposits subject to imposed caps as shown in Table 4.

15.16 NMDs shall finally be slotted into the appropriate time bucket or time bucket midpoint. Non-core deposits shall be considered as overnight deposits and accordingly shall be placed into the overnight time bucket or time bucket midpoint.

15.17 Banks shall determine an appropriate cash flow slotting procedure for each category of core deposits, up to the maximum average maturity per category as specified in Table 4.

Table 4: Caps on core deposits and average maturity by category

	Cap on the proportion of core deposits (%)	**Cap on the average maturity of core deposits (years)**
Retail/transactional	90	5
Retail/non-transactional	70	4.5
Wholesale	50	4

15.18 Under the standardized framework, the optionality in these products is estimated using a two-step approach. Firstly, baseline estimates of loan prepayments and early withdrawal of fixed-term deposits are calculated given the prevailing term structure of interest rates.

15.19 In the second stage, the baseline estimates are multiplied by scenario-dependent scalars that reflect the likely behavioral changes in the exercise of the options.

15.20 Prepayments, or parts thereof, for which the economic cost is not charged to the borrower, are referred to as uncompensated prepayments. For loan products where the economic cost of prepayments is never charged, or charged only for prepayments above a certain threshold, the standardized framework for fixed rate loans subject to prepayments set out below must be used to assign notional repricing cash flows.

15.21 Banks must determine the baseline conditional prepayment rate $CPR_{o,c}^{p}$ for each portfolio p of homogeneous prepayment-exposed loan products denominated in currency c, under the prevailing term structure of interest rates.

15.22 The conditional prepayment rate (CPR) for each portfolio of homogeneous prepayment-exposed loan products denominated in currency c, under interest rate scenario i, is given using the formula that follows, where $CPR_{o,c}^{p}$ is the constant base CPR of a portfolio p of homogeneous prepayment-exposed loans given in currency c and given the prevailing term structure of interest rates. γ_i is a multiplier applied for scenario i as given in Table 5.

$$CPR_{i,c}^{p} = \min\left(1, \gamma_i \times CPR_{o,c}^{p}\right)$$

Table 5: CPRs under the shock scenarios

Scenario number (i)	**Interest rate shock scenarios**	**Scalar multipliers γ_i**
1	Parallel up	0.8
2	Parallel down	1.2
3	Steepener	0.8
4	Flattener	1.2
5	Short rate up	0.8
6	Short rate down	1.2

15.23 Prepayment speeds vary according to the interest rate shock scenario. The multipliers $\gamma_i$reflect the expectation that prepayments will generally be higher during periods of falling interest rates and lower during periods of rising interest rates.

15.24 The prepayments on the fixed rate loans must ultimately be reflected in the relevant cash flows (scheduled payments on the loans, prepayments, and interest payments). These payments can be broken up into scheduled payments adjusted for prepayment and uncompensated prepayments according to the following formula, where $CF_{i,c}^{S}(k)$ refers to the scheduled interest and principal repayment, and $N_{i,c}^{p}(k-1)$ denotes the notional outstanding at time bucket k–1. The base cash flows (i.e., given the current interest rate yield curve and the base CPR) are given by i=0, while the interest rate shock scenarios are given for i=1 to 6.

$$CF_{i,c}^{p}(k) = CF_{i,c}^{S}(k) + CPR_{i,c}^{p} \,.N_{i,c}^{p}(k-1)$$

15.25 Term deposits lock in a fixed rate for a fixed term and would usually be hedged on that basis. However, term deposits may be subject to the risk of early withdrawal, also called early

redemption risk. Consequently, term deposits may only be treated as fixed rate liabilities and their notional repricing cash flows slotted into the time buckets or time bucket midpoints up to their corresponding contractual maturity dates if it can be shown to the BB's satisfaction that:

(1) the depositor has no legal right to withdraw the deposit; or

(2) an early withdrawal results in a significant penalty that at least compensates for the loss of interest between the date of withdrawal and the contractual maturity date and the economic cost of breaking the contract.

15.26 If neither of these conditions is met, the depositor holds an option to withdraw, and the term deposits are deemed to be subject to early redemption risk. Further, if a bank issues term deposits that do not meet the above criteria to wholesale customers, it must assume that the customer will always exercise the right to withdraw in the way that is most disadvantageous to the bank (i.e., the deposit is classified as an automatic interest rate option).

15.27 Banks must determine the baseline term deposit redemption ratio $TDRR_{o,c}^{p}$ applicable to each homogeneous portfolio p of term deposits in currency c and use it to slot the notional repricing cash flows. Term deposits that are expected to be redeemed early are slotted into the overnight time bucket (k=1) or time bucket midpoint (t_1).

15.28 The term deposit redemption ratio for time bucket k or time bucket midpoint t_k applicable to each homogeneous portfolio p of term deposits in currency c and under scenario i is obtained by multiplying $TDRR_{o,c}^{p}$ by a scalar u_i (set out in Table 6) that depends on scenario i, as follows:

$$TDRR_{i,c}^{p} = \min\left(1, u_i \,.\, TDRR_{o,c}^{p}\right)$$

Table 6: Term deposit redemption rate (TDRR) under the shock scenarios

Scenario number (i)	**Interest rate shock scenarios**	**Scalar multipliers u_i**
1	Parallel up	1.2
2	Parallel down	0.8
3	Steepener	0.8
4	Flattener	1.2
5	Short rate up	1.2
6	Short rate down	0.8

15.29 The notional repricing cash flows which are expected to be withdrawn early under any interest rate shock scenario i are described as follows, where $TD_{o,c}^{p}$ is the outstanding amount of term deposits of type p.

$$CF_{i,c}^{p} = TD_{o,c}^{p} \,.\, TDRR_{i,c}^{p}$$

15.30 This paragraph describes the method for calculating an add-on for automatic interest rate options, whether explicit or embedded. This applies to sold automatic interest rate options. Banks have a choice to either include all bought automatic options or include only automatic options used for hedging sold automatic interest rate options:

(1) For each sold automatic option o in currency c, the value change, denoted $\Delta FVAO_{i,c}^{o}$, is calculated for each interest rate shock scenario i. The value change is given by:

(a) an estimate of the value of the option to the option holder, given:

(i) a yield curve in currency c under the shock scenario; and

(ii) a relative increase in the implicit volatility of 25%; minus

(b) the value of the sold option to the option holder, given the yield curve in currency c at the valuation date.

(2) Likewise, for each bought automatic interest rate option q, the bank must determine the change in the value of the option between interest rate shock scenario i and the current interest rate term structure combined with a relative increase in the implicit volatility of 25%. This is denoted as $\Delta FVAO_{i,c}^{q}$.

(3) The bank's total measure for automatic interest rate option risk under interest rate shock scenario i in currency c is calculated as follows, where n_c (m_c) is the number of sold (bought) options in currency c.

$$KAO_{i,c} = \sum_{o=1}^{n_c} \Delta FVAO_{i,c}^{o} - \sum_{q=1}^{m_c} \Delta FVAO_{i,c}^{q}$$

15.31 If the bank chooses to only include bought automatic interest rate options that are used for hedging sold automatic interest rate options, the bank must, for the remaining bought options, add any changes in market values reflected in the regulatory capital measure of the respective capital ratio (i.e. CET1, Additional Tier 1 or total capital) to the total automatic interest rate option risk measure $KAO_{i,c}$.

15.32 First, the loss in the economic value of equity $\Delta EVE_{i,c}$ under scenario i and currency c is calculated for each currency with material exposures, i.e. those accounting for more than 5% of either banking book assets or liabilities, as follows:

(1) Under each scenario i, all notional repricing cash flows are slotted into the respective time bucket $k \in \{1, 2, \ldots, K\}$ or time bucket midpoint t_k, $k \in \{1, 2\ldots, K\}$. Within a given time bucket k or time bucket midpoint t_k, all positive and negative notional repricing cash flows are netted to form a single long or short position, with the canceled parts removed from the calculation. Following this process across all time buckets or time bucket midpoints leads to a set of notional repricing cash flows $CF_{i,c}(k)$ or $CF_{i,c}(t_k)$, $k \in \{1, 2, \ldots, K\}$.

(2) Net notional repricing cash flows in each time bucket k or time bucket midpoint t_k are weighted by a continuously compounded discount factor, described below, that reflects the interest rate shock scenario i in currency c, and where t_k is the midpoint of time bucket k. This results in a weighted net position, which may be positive or negative for each time bucket. The cash flows shall be discounted using either a risk-free rate or a risk-free rate including commercial margin and other spread components (only if the bank has included commercial margins and other spread components in its cash flows).

$$DF_{i,c}(t_k) = e^{(-R_{i,c}(t_k).t_k)}$$

(3) These risk-weighted net positions are summed to determine the EVE in currency c under scenario i (excluding automatic interest rate option positions):

$$EVE_{i,c}^{nao} = \sum_{k=1}^{k} CF_{i,c}(k) \,.\, DF_{i,c}(t_k) \text{ (maturity buckets) or}$$

$$EVE_{i,c}^{nao} = \sum_{k=1}^{k} CF_{i,c}(t_k) \,.\, DF_{i,c}(t_k) \text{ (maturity bucket midpoints)}$$

(4) Then, the full change in EVE in currency c associated with scenario i is obtained by subtracting $EVE_{i,c}^{nao}$ from the EVE under the current interest rate term structure $EVE_{o,c}^{nao}$ and by adding the total measure for automatic interest rate option risk $KAO_{i,c}$, as follows:

$$\Delta EVE_{i,c} = \sum_{k=1}^{k} CF_{o,c}(k) \,.\, DF_{o,c}(t_k) - \sum_{k=1}^{k} CF_{i,c}(k) \,.\, DF_{i,c}(t_k) + KAO_{i,c} \text{or}$$

$$\Delta EVE_{i,c} = \sum_{k=1}^{k} CF_{o,c}(t_k) \,.\, DF_{o,c}(t_k) - \sum_{k=1}^{k} CF_{i,c}(t_k) \,.\, DF_{i,c}(t_k) + KAO_{i,c}$$

(5) Finally, the EVE losses $\Delta EVE_{i,c} > 0$ are aggregated under a given interest rate shock scenario i and the maximum loss across all interest rate shock scenarios is the EVE risk measure.

$$\text{Standardized EVE risk measure} = \max_{i \in \{1,2,\ldots,6\}} \{ max\,(0;\ \sum_{c:\Delta EVE_{i,c}>0} \Delta EVE_{i,c}) \}$$

Appendix 2

Table A

Purpose: To describe the risk management objectives and policies concerning IRRBB.	
Scope of application: Mandatory for all scheduled banks***.	
Content: Qualitative and quantitative information. Quantitative information is based on the daily or monthly average of the year or the data as of the reporting date.	
Frequency: Half-yearly (June 30 and December 31)	
Format: Flexible.	
Qualitative disclosure	
A	A description of how the bank defines IRRBB for purposes of risk control and measurement.
B	A description of the bank's overall IRRBB management and mitigation strategies. Examples are monitoring of EVE and NII with established limits, the conduct of stress testing, outcomes analysis, the role of independent audit, the role and practices of the ALCO, the bank's practices to ensure appropriate model validation, and timely updates in response to changing market conditions.
C	The periodicity of the calculation of the bank's IRRBB measures, and a description of the specific measures that the bank uses to gauge its sensitivity to IRRBB.
D	A description of the interest rate shock and stress scenarios that the bank uses to estimate changes in the economic value and earnings.
E	Where significant modeling assumptions used in the bank's IMS (i.e. the EVE metric generated by the bank for purposes other than disclosure, e.g. for internal assessment of capital adequacy) are different from the modeling assumptions prescribed for the disclosure in Table B, the bank shall provide a description of those assumptions and their directional implications and explain its rationale for making those assumptions (e.g. historical data, published research, management judgment, and analysis).
F	A high-level description of how the bank hedges its IRRBB, as well as the associated accounting treatment.
G	A high-level description of key modeling and parametric assumptions used in calculating ΔEVE and ΔNII in Table B, which includes: For ΔEVE, whether commercial margins and other spread components have been included in the cash flows used in the computation and discount rate used. How the average repricing maturity of non-maturity deposits has been determined (including any unique product characteristics that affect the assessment of repricing behavior). The methodology used to estimate the prepayment rates of customer loans, and/or the early withdrawal rates for time deposits, and other significant assumptions. Any other assumptions (including for instruments with behavioral optionalities that have been excluded) that have a material impact on the disclosed ΔEVE and ΔNII in Table B, including an explanation of why these are material. Any methods of aggregation across currencies and any significant interest rate correlations between different currencies.
H	(Optional) Any other information which the bank wishes to disclose regarding its interpretation of the significance and sensitivity of the IRRBB measures disclosed and/or an explanation of any significant variations in the level of the reported IRRBB since previous disclosures.
Quantitative disclosures	
1	Average repricing maturity assigned to NMDs.
2	Longest repricing maturity assigned to NMDs.

*** For Islamic banks, Profit Rate Risk in the Banking Book (PRRBB) policies will include rate of return risk instead of interest rate risk.

Table B

Scope of application: Mandatory for all scheduled banks.				
Content: Quantitative information.				
Frequency: Half-yearly (June 30 and December 31)				
Format: Fixed.				
Accompanying narrative: Commentary on the significance of the reported values and an explanation of any material changes since the previous reporting period.				
In reporting	***Δ EVE***		***Δ NII***	
Period	**T**	**T–1**	**T**	**T–1**
Parallel up				
Parallel down				
Steepener				
Flattener				
Short rate up				
Short rate down				
Maximum				
Period	**T**		**T–1**	
Tier 1 capital				

For each of the specified interest rate shock scenarios, the bank must report for the current period and the previous period:

(i) the change in the economic value of equity-based on its IMS, using a runoff balance sheet and an instantaneous shock and

(ii) the change in projected NII over a forward-looking rolling 12-month period compared with the bank's own best estimate 12-month projections, using a constant balance sheet assumption and an instantaneous shock.

Annexure

Data Formats of IRRBB Calculation for Conventional Banks (Assets)

	Assets	ON (0.0028 Y)	ON<t^{CF} ≤ 1M (0.0417 Y)	1M<t^{CF} ≤ 3M (0.1667 Y)	3M<t^{CF} ≤ 6M (0.375 Y)	6M<t^{CF} ≤ 9M (0.625 Y)	9M<t^{CF} ≤ 1Y (0.875 Y)	1Y<t^{CF} ≤ 1.5Y (1.25 Y)	1.5Y<t^{CF} ≤ 2Y (1.75 Y)	2Y<t^{CF} ≤ 3Y (2.5 Y)	3Y<t^{CF} ≤ 4Y (3.5 Y)	4Y<t^{CF} ≤ 5Y (4.5 Y)	5Y<t^{CF} ≤ 6Y (5.5 Y)	6Y<t^{CF} ≤ 7Y (6.5 Y)	7Y<t^{CF} ≤ 8Y (7.5 Y)	8Y<t^{CF} ≤ 9Y (8.5 Y)	9Y<t^{CF} ≤ 10Y (9.5 Y)	10Y< t^{CF}≤15 Y (12.5 Y)	15Y< t^{CF}≤20 Y (17.5 Y)	t^{CF}>20 Y (25 Y)
1	Fixed rate assets other than loans with contractual cash inflow																			
2	Floating rate assets other than loans																			
3	Fixed rate retail loans subject to prepayment risk																			
4	Fixed rate retail loans subject to no prepayment risk																			
5	Fixed rate non-retail loans																			
6	Floating rate retail loans																			
7	Floating rate non-retail loans																			
8	Other interest rate sensitive assets subject to prepayment risk																			
	Total																			
	Weighted average interest rate																			
	Total rate sensitive assets																			
	Total non-rate sensitive assets																			
	Total assets																			

Data Formats of IRRBB Calculation for Conventional Banks (Liabilities)

	Liabilities			ON (0.00 28Y)	ON<t^{CF} ≤ 1M (0.0417 Y)	1M<t^{C}_{F}≤ 3M (0.166 7 Y)	3M<t^{C}_{F}≤ 6M (0.375 Y)	6M<t^{C}_{F}≤ 9M (0.625 Y)	9M<t^{CF} ≤ 1Y (0.875 Y)	1Y<t^{CF}≤ 1.5Y (1.25 Y)	1.5Y<t^{C}_{F}≤ 2Y (1.75 Y)	2Y<t^{C}_{F}≤ 3Y (2.5 Y)	3Y<t^{C}_{F}≤ 4Y (3.5 Y)	4Y<t^{C}_{F}≤ 5Y (4.5 Y)	5Y<t^{C}_{F}≤ 6Y (5.5 Y)	6Y<t^{C}_{F}≤ 7Y (6.5 Y)	7Y<t^{C}_{F}≤ 8Y (7.5 Y)	8Y<t^{C}_{F}≤ 9Y (8.5 Y)	9Y<t^{C}_{F}≤ 10Y (9.5 Y)	10Y< t^{CF}≤15 Y (12.5 Y)	15Y< t^{CF}≤20 Y (17.5 Y)	t^{CF}>20 Y (25 Y)
1	Term Deposits subject to penalty for early encashment																					
2	Term Deposits with no penalty for early encashment																					
3	Retail transactional NMD																					
	3.1	Stable portion																				
		3.1.1	Core																			
		3.1.2	Non-Core																			
	3.2	Unstable Portion																				
4	Retail non-transactional NMD																					
	4.1	Stable portion																				
		4.1.1	Core																			
		4.1.2	Non-Core																			
	4.2	Unstable Portion																				
5	Wholesale NMD																					
	5.1	Stable portion																				
		5.1.1	Core																			
		5.1.2	Non-Core																			
	5.2	Unstable Portion																				
6	Fixed rate bonds																					
7	Floating rate bonds																					
	Total																					
	Weighted average interest rate																					

	Total rate sensitive liabilities	
	Total non-rate sensitive liabilities	
	Total liabilities	

Terms	Explanations
Retail transactional Non-maturity deposits (NMDs)	(1) deposits placed by a person; (2) small business customers and managed as retail exposures (provided the total aggregated liabilities raised from one small business customer are less than 10 crores BDT). In short, all current accounts from natural persons or small businesses with balances less than or equal to Tk. 10 crores.
Retail non-transactional NMD	Deposits held in an account where regular transactions are not carried out and the rest portion of Retail transactional NMDs, Savings, SND
Wholesale NMD	Deposits from legal entities, sole proprietorships, or partnerships.
Stable portion	By using observed volume changes over the past 10 years, the stable NMD portion is the portion that is found to remain undrawn with a high degree of likelihood
Core NMD	Core deposits are the proportion of stable NMDs which are unlikely to reprice even under significant changes in the interest rate environment

Data Formats of IRRBB Calculation for Islamic Banks (Assets)

	Assets	ON (0.0028Y)	ON< t^{CF}≤ 1M (0.0417Y)	1M< t^{CF}≤ 3M (0.1667 Y)	3M< t^{CF}≤ 6M (0.375 Y)	6M< t^{CF}≤ 9M (0.625 Y)	9M< t^{CF}≤ 1Y (0.875 Y)	1Y< t^{CF}≤ 1.5Y (1.25 Y)	1.5Y< t^{CF}≤ 2Y (1.75 Y)	2Y< t^{CF}≤ 3Y (2.5 Y)	3Y< t^{CF}≤ 4Y (3.5 Y)	4Y< t^{CF}≤ 5Y (4.5 Y)	5Y< t^{CF}≤ 6Y (5.5 Y)	6Y< t^{CF}≤ 7Y (6.5 Y)	7Y< t^{CF}≤ 8Y (7.5 Y)	8Y< t^{CF}≤ 9Y (8.5 Y)	9Y< t^{CF}≤ 10Y (9.5 Y)	10Y< t^{CF}≤15 Y (12.5 Y)	15Y< t^{CF}≤20 Y (17.5 Y)	t^{CF}>20 Y (25 Y)
1	All "Bai-mode" investments																			
2	Share-mode Investments																			
	2.1 Mudaraba																			
	2.2 Musharaka																			
3	All Ijara-mode investments																			
	Total																			
	Weighted average rate of return																			

	Total rate sensitive assets	
	Total non-rate sensitive assets	
	Total assets	

Data Formats of IRRBB Calculation for Islamic Banks (Liabilities)

	Liabilities			ON (0.0028Y)	ON< t^{CF}≤ 1M (0.0417Y)	1M< t^{CF}≤ 3M (0.1667 Y)	3M< t^{CF}≤ 6M (0.375 Y)	6M< t^{CF}≤ 9M (0.625 Y)	9M< t^{CF}≤ 1Y (0.875 Y)	1Y< t^{CF}≤ 1.5Y (1.25 Y)	1.5Y< t^{CF}≤ 2Y (1.75 Y)	2Y< t^{CF}≤ 3Y (2.5 Y)	3Y< t^{CF}≤ 4Y (3.5 Y)	4Y< t^{CF}≤ 5Y (4.5 Y)	5Y< t^{CF}≤ 6Y (5.5 Y)	6Y< t^{CF}≤ 7Y (6.5 Y)	7Y< t^{CF}≤ 8Y (7.5 Y)	8Y< t^{CF}≤ 9Y (8.5 Y)	9Y< t^{CF}≤ 10Y (9.5 Y)	10Y< t^{CF}≤15Y (12.5 Y)	15Y< t^{CF}≤20Y (17.5 Y)	t^{CF}>20Y (25 Y)
1	Mudaraba Deposits subject to penalty for early encashment																					
2	Retail transactional NMD																					
	2.1	Stable portion																				
		2.1.1	Core																			
		2.1.2	Non-Core																			
	2.2	Unstable Portion																				
3	Retail non-transactional NMD																					
	3.1	Stable portion																				
		3.1.1	Core																			
		3.1.2	Non-Core																			
	3.2	Unstable Portion																				
4	Wholesale NMD																					
	4.1	Stable portion																				
		4.1.1	Core																			
		4.1.2	Non-Core																			
	4.2	Unstable Portion																				
5	Floating rate bonds/Sukuk																					
6	Fixed rate bonds/Sukuk																					
	Total																					
	Weighted average rate of return																					

	Total rate sensitive liabilities	
	Total non-rate sensitive liabilities	
	Total liabilities	