Navigating IRRBB: Enhancing Behavioural Models for Effective Risk Management

In February 2025, the Hong Kong Monetary Authority (HKMA) issued a new circular to bolster the management of interest rate risk for authorized institutions (AIs) in light of the evolving operating environment. This circular draws on insights from the HKMA's recent review of AIs' practices, continuing to stress its increasing attention to behavioral models of Interest Rate Risk in the Banking Book (IRRBB).

It is imperative for these institutions to take necessary steps to enhance their methodologies and governance, thereby improving the reliability and accuracy of their IRRBB assessments.

Since Alternative Reference Rates (ARR) reporting guidelines in March 2021

- **Lessons drawn on the Banking Turmoil in the US and Europe related to IRRBB** — December 2023
- **BCBS recalibration of shocks for IRRBB *(To be effective in January 2026)*** — July 2024
- **IRRBB – Good Practice on Using Behavioural Models** — February 2025

Calling for increased awareness of IRRBB behavioral model management

AIs that currently employ or intend to implement behavioral models for IRRBB measurement—including, but not limited to, models associated with non-maturity deposits (NMDs)—are urged to carefully consider these observations and best practices as categorized below.

(I) Model development & implementation	AIs should not rely solely on historical data for modelling depositor behaviours; they should assess and consider **forward-looking elements** and ensure **adequate granularity in segmentation** to adapt to changing operating environment and business strategy.
(II) Periodic validation & continuous monitoring	AIs should actively monitor behavioral models by conducting **at least annual validation**, including back-testing and sensitivity analyses, alongside **ad-hoc reviews** based on established **monitoring procedure**.
(III) Governance & control	AIs should implement comprehensive governance frameworks for managing behavioral models, e.g., **effective management oversight, robust policies and procedures** and **thorough documentation**. AIs should also consider using the model output for business strategies and align with other balance sheet and ALM initiatives (e.g. funding gap management).

*In case where third-party vendor or group level models are used, additional requirements are set up on model calibration, adoption, and model risk management.

Our PoV: Immediate next step for Banks

- Kick-start independent **model validation** if there is no annual validation procedure in place, to ensure that its models remain relevant and effective in the face of changing market conditions, preparing for **potential HKMA onsite review**
- Perform impact analysis on the potential model change and recalibrated shock on **regulatory returns, disclosures and Internal Capital Adequacy Assessment Process (ICAAP)**
- Report relative detailed analysis to **Senior management, Chief Risk Officer and Risk Management Committee** and **obtain approval**

The expectation of incorporating **(1) forward-looking element** and **(2) better segmentation approach** will not only ensure the IRRBB model effective and sound, but also facilitate bank's **internal risk management practices**, such as **Supervisory Driven Stress Test (SDST) and ICAAP integration.**

Model forward-looking element

The forward-looking guideline is considered as the most challenging requirement in the industry due to potential need of model work and a lack of resources. Since the guideline does not impose restrictions on approaches, banks may explore methods that best integrate their risk management views.

More quantitative approach ← → *More qualitative approach*

Algorithmic model

- Banks can consider to transform appropriate external factors into dependent variables that can be built in models for predicting customer behaviours
- Example: multi-variable regression

Benefits

✓ Data-driven and objective
✓ Statistical soundness when adopting external factors

Challenges

× Difficulty for granular data collection of certain business factors, e.g., market concentration
× Potential over-fitting effect that decreases model stability

Data-driven analysis

- Banks can opt to identify numeric relationship between target customer behaviours and selected external factors based on data analysis and business judgement
- Example: correlation analysis

Benefits

✓ Data-driven and objective
✓ High visibility for internal management and explanation
✓ Flexible to change

Challenges

× Effort required for consolidating data of certain business factors, e.g., internal pricing references

Expertise judgement

- Banks can rely on expertise knowledge and apply them as overlay on top of existing model results
- Example: department survey or industry benchmarking

Benefits

✓ Least effort required in operation and maintenance
✓ Highest visibility to management

Challenges

× Concerns on explanatory power and supporting rationale

★ **Recommended**

PwC has developed a scorecard approach, with a set of analytics tools and procedure workflows that are readily to be deployed for standardising future operations. (Illustrative process below)

Illustration of PwC implementation approach

1. Determine potentially in-scope elements for self-assessment
2. Define the indicative levelling and corresponding impacts
3. Design the scorecard template and operational workflow
4. Incorporate management considerations for future application

Next Step: Level Up the Development and Use of Behavioural Models

The expectation of incorporating **(1) forward-looking element** and **(2) better segmentation approach** will not only ensure the IRRBB model effective and sound, but also facilitate bank's **internal risk management practices**, such as **SDST and ICAAP integration**.

Considering risk factors in modelling the customer behaviours, particularly for non-maturing deposit (NMD), is likely to reduce or explain the dispersion in models for similar profiles.

A tailored assessment is needed to balance the increased data requirements from upstream databases and potential improvement in model performance.

Model segmentation

1. **Identify a comprehensive list for segmentation self-assessment**
2. **Deep-dive portfolio analysis re the selected criteria**
3. **Confirm the economic plausibility of adopted segmentation**

Common elements that may impact the depositor/lender behavior
• Natural person/SME
• Transactional/non-transactional
• Current/saving/others
• Currency
• Deposit protection scheme coverage
• Digital interaction
• ……

I. Perform portfolio analysis based on potential segmentation criteria

II. Quantitatively assess the similarity between granular sub-segments for optimising the resulted segmentation

I. Cross-compare observations with practices on liquidity risk management

II. Backward assessment on the interplay between segmentation characteristics and model results

Deep-dive in Better Model Management

By encompassing the three key pillars of IRRBB model good practices, banks can ensure robust risk management throughout the IRRBB journey that spans model validation, model application as well as governance and control.

Here are additional considerations that could be incorporated to enhance the model management practices during Bank's self-assessment.

(I) Ensure Model Accuracy Through Validation

Some banks maintain well-defined on-and-off-review cycles to ensure the models adapt to new data in the changing environment, for example:

- Periodic procedures (annual validation and off-cycle comprehensive review) - including calibration, validation, remediation (if necessary), application and monitoring
- Ad-hoc review - alerted by predefined triggers along with investigation actions

(III) Strengthened Model Governance & Control

Banks can increase internal awareness of model implication by informing decisions related to:

(1) risk management – provision of holistic view on risk dynamics **from sensitivity and what-if analysis**;

(2) Treasury strategy – reference for hedging and asset sheet management **from repricing gap analysis**

Specifically, Banks should ensure proper internal approval process in place, with the roles of senior management and 3 lines of defences defined clearly in documentation

How can we help?

PwC is a market leader in the implementation of IRRBB standards, offering a comprehensive suite of services and solutions designed to help you navigate the regulatory landscape with confidence. Our offerings span the entire process, from data preparation for modelling to model development and validation, as well as a thorough review of your entire IRRBB framework.

Model (Re-)development

- Develop a set of IRRBB behavioral models for products with behavioral optionality, including fixed-rate loans subject to prepayment risk, fixed-rate loan commitments, term deposits subject to early redemption risk, and non-maturity deposits.

Model Validation

- Perform comprehensive assessments and validations of your behavioral model implementations, including back-testing and sensitivity analysis, to identify gaps in compliance with regulatory standards and best practices.

Model Governance

- Leveraging the global and local expertise knowledge of model risk management, including model tiering, model lifecycle management and model governance, implement or enhance the use of IRRBB models along with other bank-wide models

IRRBB Framework Review

- Conduct an independent review of IRRBB policies & procedures, including the calculation of NII, EVE, and Basis Risk Exposure.
- Provide detailed insights into the relevant rules, guidelines, and best practices associated with the IRRBB behavioral model.

Contact us

We would be delighted to discuss the contents of IRRBB behavioral models and related enhancements outlined above and explore how it could bring value to your business.

Please reach out to us if you have any questions or queries.

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