# Basel IRRBB Regulation: A Framework for Managing Interest Rate Risks

## About the Authors

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## Abstract

The Basel Committee published new standards on Interest Rate Risk in the Banking Book (IRRBB) during April 2016. Banks are required to comply with new Basel IRRBB standards beginning with the financial year ending December 31, 2017. The new standard establishes an enhanced standardized methodology for comprehensive capture of risk under the Basel 'Enhanced Pillar 2' framework.

The regulation necessitate banks to upgrade existing IT applications and infrastructure, as well as data aggregation systems over the next few years focusing on data quality and model governance. Understanding the contradictions between, economic value and earnings-based measures, and rebalancing the balance sheet to strike a tradeoff between the two, will form an integral part of banks' IRRBB initiatives.

## IRR: Renewed Focus

Interest Rate Risk (IRR) is inherent in the financial industry; interest rate movements affect banks' earnings and capital. It is a critical aspect, as banks attempt to bridge gaps between savings and investments by converting short-term deposits into long-term loans. Since, Banks' earnings depend on the relationship between asset-liability and their related interest income and expenses. Banks' earnings arise from a positive spread between interest income and interest expense. Any change in the rates will directly reflect on the spreads, and can dramatically alter the earning profile.

Regulators have made serious efforts to replace hitherto non-standardized IRRBB practices with a standard framework.[1] Despite being a significant risk, IRR was not adequately captured under Pillar 2 of the Basel Accord. However, low interest rate[1] environment has prompted regulators to introduce a standard IRRBB framework to capture IRR and calculate the minimum capital required to combat it. IRRBB is all pervasive as changes in interest rates not only affect balance sheet but also, off-balance-sheet items, which impact, interest rate movements.

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[1] Ben Bernanke, Why are Interest Rates so Low? March 30, 2015, https://www.brookings.edu/blog/ben-bernanke/2015/03/30/why-are-interest-rates-so-low/ accessed December 15, 2016

The European Banking Authority (EBA) has published IRRBB regulations arising from non-trading activities that are in effect since January 2016.[2] EBA has primarily focused on refining Pillar 2 (supervisory review process) framework to ensure uniform IRRBB practices across EU.

## IRRBB: Moving from Pillar to Pillar

The Basel Committee on Banking Supervision (BCBS) has positioned IRRBB under the 'Enhanced Pillar 2 approach'. Banks can apply internally modeled parameters to products with behavioral maturity and propose a comprehensive standardized product-specific model framework as a , to be used as fallback option. Hence, a multiple-scenario-based measurement methodology that gives equal weightage to earnings and economic value will lead to an explicit capital requirement calculation.

The banks that fall under regulatory purview include:
- Internationally active banks (consolidated basis)
- Subsidiaries of internationally active banks
- Large banks or cross-border banks
- Banks with complex systemic risk (deemed by national supervisor)
- Other banks (deemed by national supervisor by size, nature, economic significance)
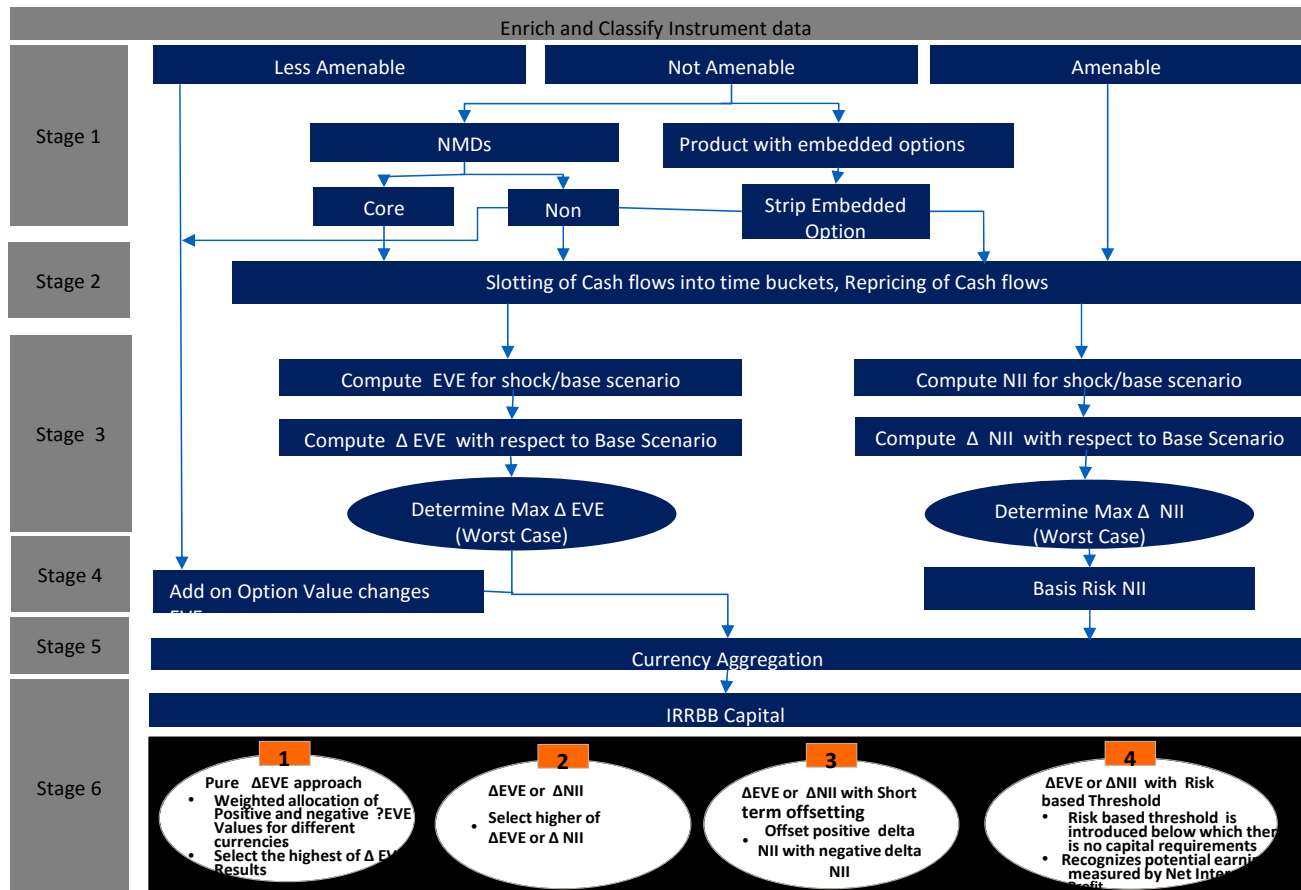


Figure 1: Proposed IRRBB Measurement Framework

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## Details in the framework

Stage1: Categorize banking book positions:
- Amenable: Deterministic cash flows with definite time to maturity
- Less amenable: Cash flows partly determined with uncertainties
- Not amenable: Non-deterministic cash flows, products with behavioral maturity, and non-maturity deposits (NMDs)

Stage2: Categorize cash flows into 19 clearly defined time buckets. Products with behavioral maturity are slotted into different buckets based on internal models or product-specific standardized framework prescribed by the regulation.

Stage3: Determine present value of long-term cash flows, under the six different shock scenarios, to calculate Economic Value of Equity (EVE), and change in EVE with respect to base scenario. Calculate present value of short-term Net Interest Income (NII) for time horizons of one-three years for parallel shock-up and parallel shock-down scenarios. Determine change in NII with respect to base scenario. The regulation recommends a maximum time horizon of five years for NII calculation.

Stage4: Augment worst aggregated NII or EVE changes, with maximum add-ons for interest rate options in case of EVE numbers and basis risk to the NII numbers, determined in stage 3.

Stage5: Compute EVE and NII changes, add-ons and basis risk for each of the currencies reported in the banking book and aggregate the results across currencies, before converting into the base currency.

Stage6: Determine explicit capital requirements under new IRRBB standards, using any of the below methodologies[3]
- Pure ΔEVE:
  EVE results across currencies are aggregated under given interest rate shock scenarios to recognize offsetting between EVE reductions in certain currencies against EVE increases in other currencies.
  Net EVE change is augmented, by bank's total measure for automatic interest rate option for respective interest rate shock scenarios. Of all the interest rate shock scenarios, the maximum net EVE change (maximum loss) is carved out for capital purposes.
- Higher of ΔEVE or ΔNII:
  This is an extension of the pure ΔEVE framework where NII changes are aggregated across currencies for given interest rate shock scenarios. Under the option system, the highest value on comparison between NII change and EVE change is used in capital calculations.
- ΔEVE or ΔNII with short-term offsetting:
  Here, short-term gains may offset losses associated with EVE change for an interest rate shock scenario. The maximum net EVE changes after short-term offsetting is considered in capital calculations.
- ΔEVE or ΔNII with risk-based threshold:
  A risk-based threshold called Net Interest Profit (NIP) is subtracted from minimum capital requirements associated with changes to EVE and NII. Below this threshold, no capital is required for banking book earnings.

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[3] Basel Committee on Banking Supervision, Interest Rate Risk in the Banking Book, June 2015, April 2016, http://www.bis.org/bcbs/publ/d319.pdf

## Impact of IRRBB and Opportunities

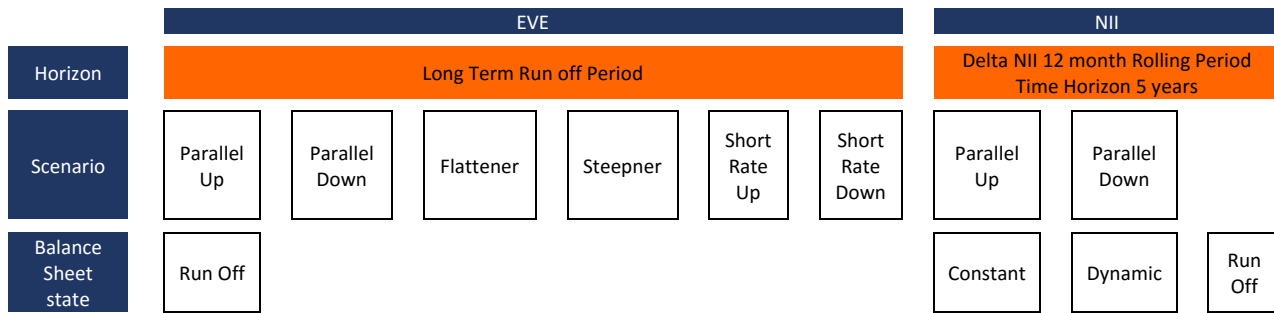| Horizon | EVE | | | | | | NII | | |
|---|---|---|---|---|---|---|---|---|---|
| | Long Term Run off Period | | | | | | Delta NII 12 month Rolling Period Time Horizon 5 years | | |
| **Scenario** | Parallel Up | Parallel Down | Flattener | Steepner | Short Rate Up | Short Rate Down | Parallel Up | Parallel Down | |
| **Balance Sheet state** | Run Off | | | | | | Constant | Dynamic | Run Off |

Figure 2: Parallel Computation of EVE and NII

The standard suggests computing EVE and NII in parallel. However, long-term EVE and short-term NII measures have contradictions. Periods of increasing interest rates can potentially depress EVE numbers while positively impacting NII. Banks require updated systems to calculate EVE and NII simultaneously under different scenarios, using distinct inputs and assumptions. While EVE calculations are run for seven interest-rate shock scenarios including base scenario, NII calculations are performed for three scenarios, incorporating different time horizons and balance-sheet states (constant, run-off and dynamic) that are modeled.

### Analytics-led behavioral modeling

Behavioral modeling is necessary for cash flow bucketing and re-pricing of products with behavioral maturity. It is imperative to capture high-quality customer behavior data, for products in varying interest-rate environments over long-time horizons. Like, withdrawal of non-maturing deposits and term-deposits with options, prepayment of loans with pre-payment option and pull-through-ratios (fixed-rate-loan commitments).

However, there is no mention of deposit re-pricing beta factor, essential for pricing deposits in volatile interest rate environments. This is a potential challenge. We believe Big Data analytics can build internal models that reflect customer behavior. Banks can effectively measure and hedge IRR for such positions. Statistical analysis of high-quality customer behavior data will help model behavioral trends and forecast customer behavior.

### Revamp of IT architecture

Banks should configure IT systems and processes to compute EVE and NII using standardized and non-standardized assumptions. Several market data inputs (currency rates used for mark to market (MTM) and funding rates used for amortized costs) are standardized for both EVE and NII. The design and implementation of parameterization logic drives standardization with shades of localization in both short-term and long-term interest rate measures.

The process of automating distinct stages of IRRBB measurement is a major challenge. Instrument data enrichment and associated business rules configuration and automatically classifying instruments into amenable, not amenable, and less amenable categories pose difficulties. This is the first-stage, high-impact automation process, necessary to identify IRRs.

## Emerging technologies to the rescue

New technologies can help resolve some of the challenges, for instance, for EVE and NII, in-memory platforms can be used to enable parallel computation of zero-coupon-rates and forward-rates for different cash flow buckets. Similarly, for revaluing portfolios (with a range of complex scenarios and yield curve paths), High Performance Computing (HPC) can be used to enable faster computation of complex calculations and effectively perform basis risk computation for floating rate changes and yield curve scenario analysis for large volume of cash flows.

## The Way Forward

Banks' IRRBB journey necessitates understanding the contradictions between economic value and earnings-based measures and rebalancing the balance sheet to strike a tradeoff between the two. Modeling of beta in re-pricing of cash flows is likely to become vital for the bank's IRRBB compliance program. IT investments with innovations in balance sheet management can help banks comply with the IRRBB regulations while offering significant opportunities to minimize IRRs, and optimize EVE and NII.

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