# Navigating Market Risk

## Insights into U.S. notice of proposed rulemaking

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## Introduction

The financial ecosystem has continuously evolved with ever-evolving complex products, which subsequently resulted in ever-emerging regulatory frameworks. Among the latest developments, the Notice of Proposed Rulemaking (NPR) by US regulators signifies a transformative phase, aligning American market risk standards with global benchmarks, particularly the Fundamental Review of the Trading Book (FRTB) as prescribed under Basel III.1 (Basel IV). This alignment not only presents diverse opportunities but also introduces intricate challenges and mandates for institutions to weave a balance between standardised approaches and customised internal models for different trading desks.

The below table provides an overview of what has changed in FRTB compared to BASEL III

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| Aspect | Basel III | Basel III.1 (FRTB) |
|---|---|---|
| **Main risk measure** | Value-at-Risk (VaR) | Expected Shortfall (ES) |
| **Stress measure** | Stressed VaR (sVaR) | Stressed conditions are incorporated into the ES calculation |
| **Default risk** | Incremental Risk Charge (IRC) for default and migration risks | Default Risk Charge for default risks |
| **Treatment of risk Factors** | No explicit differentiation | Distinction between modellable and non-modellable risk factors |
| **Standardised approach** | Simplified standardised approaches | Sensitivities-Based Method |
| **Internal models** | General permission for using internal models | Trading desk-specific approval is required for internal models. Otherwise, banks will have to go for a standardised approach with prescribed formulas to compute capital charge. |
| **Boundary Definition** | Less clear distinction between banking and trading books | More rigid criteria to demarcate the boundary between banking and trading books |
| **Capital for Non-modellable risks** | RNIV, was introduced as part of BASEL III to capture risks not adequately reflected in VaR models | Specific capital charges introduced for non-modellable risk factors |
| **P&L attribution** | Not required | New P&L Attribution test to validate the quality of internal models |
| **Liquidity horizons** | Not explicitly addressed | Differentiated liquidity horizons based on the nature of risk factors introduced |

## A global perspective: FRTB, NPR, and the convergence towards a unified risk framework

The Basel Committee's FRTB stands as a global blueprint for market risk management, ensuring a transparent, coherent, and standardised risk assessment methodology. With the NPR's alignment with the FRTB, the U.S. financial industry exemplifies its commitment to adopting global practices. This harmonisation will result in enhanced transparency, and refined risk assessments, but on the other hand will require more rigorous modelling and backtesting requirement in case banks opt for the IMA approach.

## The standardised approach to market risk: A closer examination

### 1. Foundational framework:

The NPR delineates a composite framework, merging the standardised approach to capital requirement with three auxiliary components: the fallback capital requirement, the capital add-on requirement for re-designations, and an additional capital stipulation set by the primary federal supervisor. It emphasises that banking institutions compute the standardised measure for market risk weekly, underscoring the dynamism inherent in market operations

### 2. Sensitivities-based Method (SBM):

At its core, the SBM can be likened to a foundational stress test. It envisions the potential alterations in the value of market risk positions by applying standardised market shocks. Using risk weights, the SBM emulates the effects of market upheavals based on predetermined liquidity timelines under stress scenarios.

Execution process of SBM:

- **Position classification:**

  Market risk positions are segmented and classified into specific risk classes. For each market risk position within its designated class, defined risk factors are ascertained. A rigorous methodology outlines the calculation of position sensitivity, presenting a detailed framework for the consolidation of weighted sensitivities both within and across risk classes.

- **Risk class bucketing:**

  The SBM enumerates seven standardised risk classes, encompassing interest rate risk, credit spread risk (across diverse positions), equity risk, commodity risk, and foreign exchange risk. This bucketing approach resonates with industry practices, conglomerating positions exhibiting similar risk traits.

- **Position mapping:**

  Each financial position is meticulously mapped to pertinent risk factors within its designated bucket. For instance, a corporate bond's valuation is influenced by both interest rates and issuer credit spreads, warranting its placement in two distinct risk classes.

- **Risk factor analysis:**

  A granular risk factor evaluation discerns the potential impact on a position's valuation, factoring in minute shifts in its value and associated volatility. Sensitivity calculations, encompassing delta, vega, and curvature risks, depict the value alterations stemming from designated risk factor changes. Any other sensitivity which is not captured above, is captured basis an additional charge called Residual Risk Add On (RRAO).

- **Aggregation of risk factors:**

  Formulas proposed in the NPR facilitate the consolidation of total delta, vega, and curvature capital prerequisites within and across risk buckets. These aggregation formulas introduce correlation parameters, intentionally dampening the risk-mitigating influence of hedges and diversification, particularly under stress scenarios.

- **Correlation scenarios:**

  The NPR establishes three distinct correlation scenarios – high, medium, and low. These scenarios gauge the potential for correlations between risk factors to oscillate during volatile periods. The cumulative capital requirement for each scenario emerges by amalgamating the separately calculated delta, vega, and curvature capital stipulations across all risk classes.

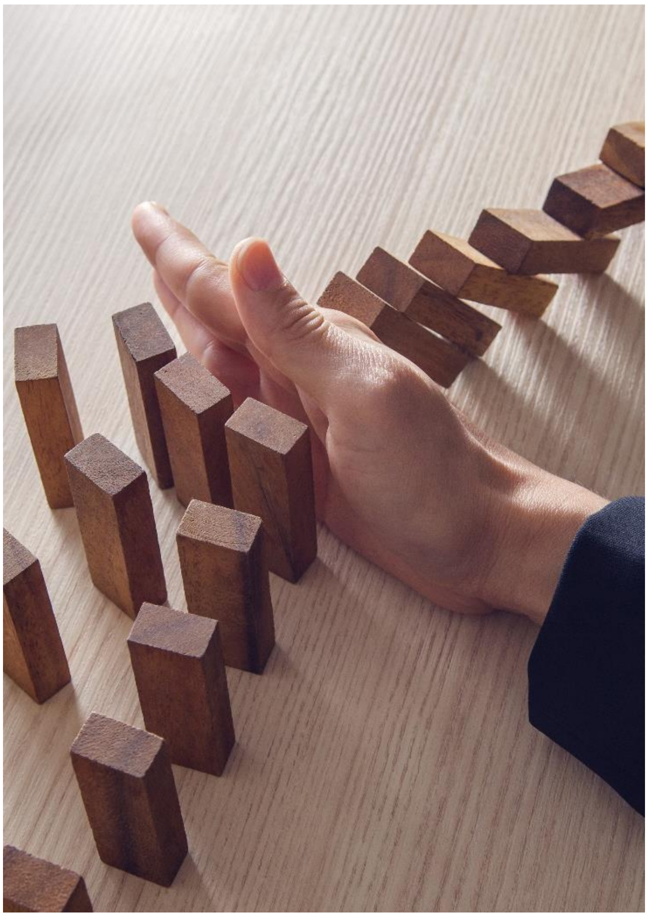
**Conclusion of SBM:**

The capital requirement derived from the sensitivities-based method emerges by selecting the most stringent capital requirement from the three correlation scenarios. This ensures that institutions are safeguarded against the gravest potential market upheavals.

## 3. Standardised default risk capital requirement

**Introduction:**

The standardised default risk capital requirement seeks to capture the incremental loss that arises if the issuer of an equity or credit position were to immediately default, particularly addressing the risks not accounted for by the credit spread or equity shocks in the sensitivities-based method.



**Scope of Application:**

This requirement is proposed for:

- Non-securitisation debt or equity positions (excluding U.S. sovereigns and multilateral development banks)
- Non-CTP securitisation positions
- Correlation trading positions

**Computation methodology:**

The proposal outlines a five-step process for calculating the standardised default risk capital requirement:

**Bucketing based on risk characteristics:** Banking organisations must group instruments with similar risk characteristics throughout an economic cycle into defined default risk buckets.

**Position-level loss estimation:** The organisation needs to calculate the gross default exposure separately for each default risk position, discerning between potential losses (long) or gains (short) in the event of an issuer default.

**Portfolio-level loss estimation:** Organisations must calculate the net default exposure for each obligor, offsetting gross long and short exposures where permitted.

**Hedging benefit recognition:** Banking organisations are expected to calculate the hedge benefit ratio and apply specific risk weights to net default exposures within the same risk bucket. This step is to recognise the potential hedging benefits between net long and net short positions of different issuers within the same default bucket.

**Calculation of the capital requirement:** Finally, organisations are required to sum the bucket-level capital requirements. The methodology does not recognise diversification benefits across different types of default risk categories to maintain conservatism.

**Conclusion:**

The introduction of the standardised default risk capital requirement aims to bridge the gap between existing methodologies and the realities of potential immediate defaults. This step ensures that banks maintain appropriate capital buffers against unforeseen events, thus fostering a more resilient banking landscape.

## 4. Residual risk add-on

**Background:**

The standardised approach in regulatory frameworks can't feasibly account for every nuance between various market risks, especially considering the evolving nature of financial products. Recognising this, the US NPR introduces the concept of a residual risk add-on, ensuring that risks not fully captured by the sensitivities-based capital requirement or the standardised default risk capital requirement are addressed.

**Objective of the residual risk add-on:**

The intent behind this add-on is to encompass exotic risks, including but not limited to weather-related risks, longevity, and natural disasters. Beyond these, the residual risk add-on also targets other more obscure risks, like gap risk, correlation risk, and behavioural risks including prepayments.

**Calculation and specifics:**

- For positions exhibiting exotic exposures (such as longevity risk or natural disaster risk), a capital requirement equaling 1 per cent of the gross effective notional amount of the market risk covered position is proposed. These risks aren't adequately covered under the sensitivities-based method.
- For other market risk positions with residual risks, a capital requirement equivalent to 0.1 per cent of the gross effective notional amount is suggested. This category would include risks from correlation trading positions with three or more underpinnings, positions with intricate optionality, and those without specific maturities, strikes, or barriers.
- It's important to note that, under this proposal, the primary federal supervisor retains the authority to subject other market risk-covered positions to the residual risk add-on when deemed necessary.

**Exclusions and clarifications:**

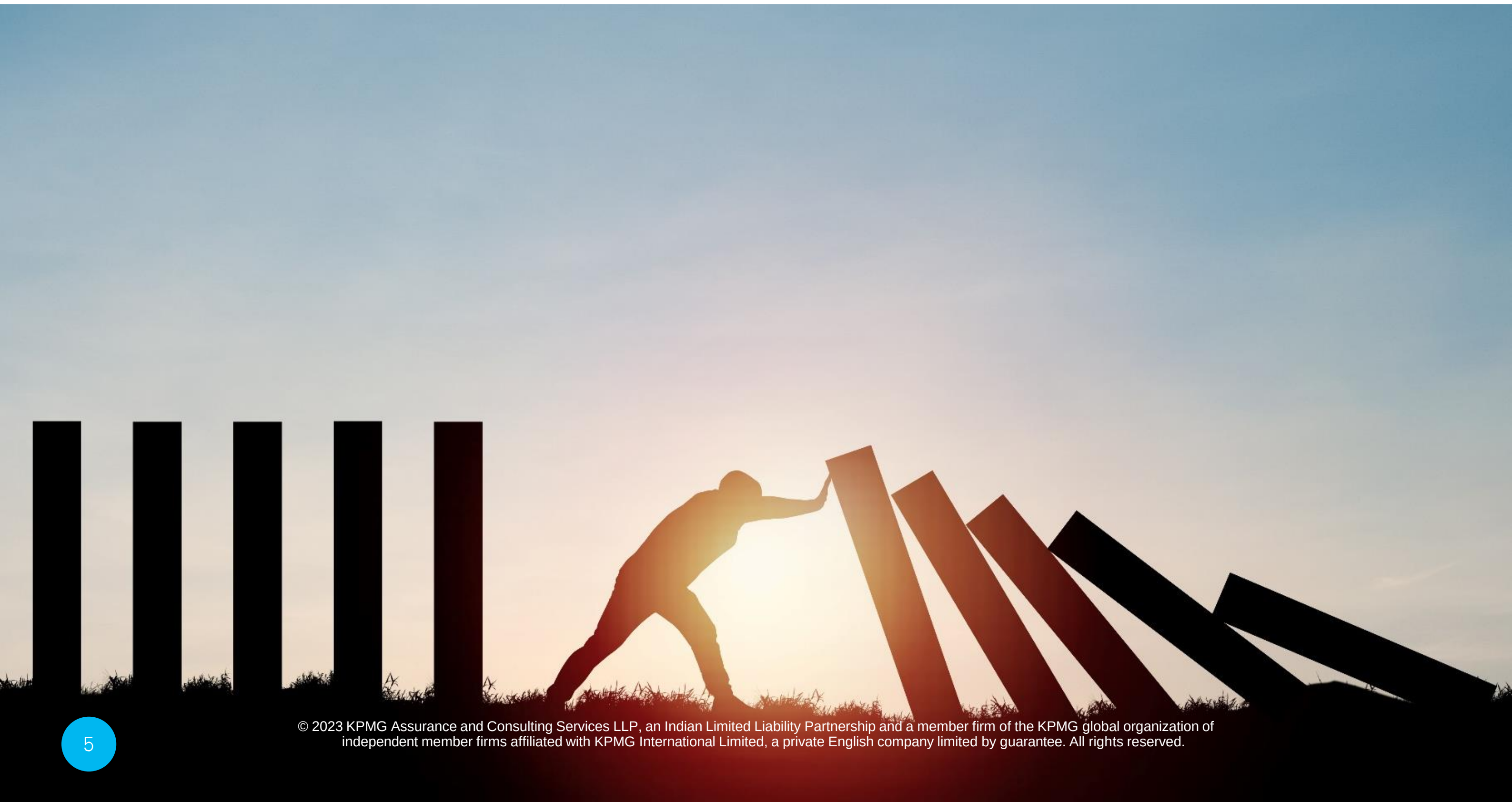
The NPR offers clarity on certain positions that can be excluded from the residual risk add-on:

- Positions without an exotic exposure that are either listed on an exchange, can be cleared by a CCP or QCCP, or are simple options.
- Positions matching a back-to-back transaction, where the long and short positions of identical trades offset each other.
- Specific offsetting positions which exhibit minimal residual risks. Examples include positions hedging a banking organisation's obligation to fulfill a derivative contract, any GSE debt, internal transactions between two trading desks, and others deemed unnecessary by the primary federal supervisor.

The intent behind these exclusions is to ensure that the capitalisation of risk is appropriate and that the residual risk add-on doesn't become unnecessarily punitive.

**Conclusion:**

The residual risk add-on, as proposed in the US NPR, acknowledges the limitations of a purely standardised approach. By incorporating a method to account for complex, less understood risks, this proposal aims to create a more resilient banking framework, ensuring that institutions are adequately capitalised against both commonplace and exotic market risks.



## Applicability across the financial spectrum

Remarkably, NPR's purview extends beyond just large-scale financial entities. Even firms with assets under $100 billion find themselves encapsulated if they meet specific benchmarks, such as trading assets + liabilities exceeding USD5 billion or accounting for a significant chunk of total assets. This comprehensive approach underscores the regulators' unwavering commitment to holistic market risk management.

## Revamping operational paradigms

As the financial sector aligns with the FRTB and NPR stipulations, institutions stand on the precipice of operational metamorphosis. This transformation is not just operational but spans the realms of technology, analytics, and human expertise. Given the intricate risk measurement paradigms introduced, vast resources are warranted to ensure seamless adaptation and compliance.

## The Internal Models Approach (IMA): A comprehensive insight

The IMA, as proposed, is an intricate approach aimed at helping financial institutions assess and manage their market risk. This approach acknowledges the diversity and complexity inherent in the trading portfolios of modern banks. By allowing institutions to rely on internal models, it provides a tailored framework, ensuring that capital requirements accurately reflect each bank's unique risk profile. The IMA, however, necessitates rigorous validation and compliance checks to ensure the accuracy and integrity of these internal models.

### 1. Delving into the components of IMA:

**a. Internally Modelled Capital Calculation (IMCC):**

- Purpose: The IMCC is at the heart of the IMA. Its primary function is to assess market risks that can be quantified using observable market data.
- Mechanism: This component harnesses expected shortfall measure. The US NPR introduces the concept of an "expected shortfall," a risk measure designed to estimate the potential losses a banking organisation could face under extreme market conditions. This measure differs from the Value-at-Risk (VaR) approach primarily in its focus on extreme tail risks and its accounting for the severity of losses in those tail events, rather than merely the likelihood of a certain loss occurring. Under the proposal, the expected shortfall will capture losses arising from modellable risk factors on model-eligible trading desks during a stringent twelve-month stress period. It requires banks to compute this on a daily basis, adopting either a one-tail, 97.5th percentile confidence interval, covering various risk classes at the entity-wide level.

  To derive the expected shortfall, the NPR outlines a choice between a direct approach, which uses the full set of modellable risk factors, and an indirect approach, which permits the use of a subset of these risk factors. This flexibility recognises the challenges banks might face in estimating losses based on the full set of modellable risk factors during stressed conditions, either due to data constraints or operational issues.

  Regardless of the chosen approach, the NPR sets parameters to ensure that the derived expected shortfall values are robust and reflective of underlying risks. For instance, under the indirect approach, the reduced set of risk factors used must explain at least 75 per cent of the variability of the losses estimated by the full set over the preceding 60 business days.

  In sum, NPR's expected shortfall measure offers a more comprehensive risk assessment tool than VaR, particularly in the context of extreme market downturns, ensuring that banks maintain adequate capital buffers against such tail events.

**b. Stressed Expected Shortfall (SES):**

- Purpose: The SES component acknowledges the existence of risk factors that cannot be easily modeled due to limited observable data.
- Mechanism: The conservative nature of SES stems from its engagement with these non-modellable risk factors (NMRFs). By calculating potential losses under stressed market conditions, it ensures that banks are adequately capitalised even when faced with unforeseeable market shocks.

**c. Standardised default risk capital requirement:**

- Purpose: This component provides a framework for evaluating the default risk inherent in a bank's trading portfolio.
- Mechanism: The NPR advocating for a unified approach wherein all banking institutions must adhere to the standardised default risk capital requirement. This holds true irrespective of whether they opt for the IMCC plus SES framework or choose the sensitivities-based method combined with the residual risk add-on for non-default market risk elements. The primary motivation behind this streamlined approach is twofold: to alleviate operational pressures on banks and to foster a more uniform risk-based capital framework, ensuring equity in regulatory standards across all banking entities.

**d. Aggregate trading portfolio backtesting capital multiplier:**

- Purpose: Recognising that no model is infallible, this component is designed to act as a safeguard against potential model inaccuracies.
- Mechanism: The multiplier adjusts the capital requirement based on the outcomes of backtesting. If a bank's trading outcomes consistently deviate from its model's predictions, the multiplier will increase its capital requirements. This ensures that even if a bank's model underestimates risk, it still maintains enough capital to absorb potential losses.

## Diving deeper into the SA and IMA dilemma:

- **The genesis of SA and IMA:**

  The NPR introduced two primary approaches for risk management: the Standardised Approach (SA) and the Internal Models Approach (IMA). These approaches were conceived to offer banks option, from a more prescriptive method (SA) to a flexible, tailored approach (IMA). The genesis of these approaches can be traced back to the lessons learned from previous financial crises, where rigid or overly complex models failed to capture evolving risks.

- **Pros and cons of the SA:**

  The SA, with its standardised calculations, offers a universalistic approach to risk management. It provides clarity and uniformity, ensuring that banks, regardless of their size or complexity, adhere to a common set of guidelines. However, this one-size-fits-all approach can sometimes be a double-edged sword. For banks with unique risk profiles or those operating in niche markets, the SA might not capture the nuances of their specific risks, potentially leading to overestimation of capital requirements.

- **The flexibility and challenges of IMA:**

  The IMA, on the other hand, offers banks the flexibility to use their internal models, tailored to their specific risk profiles. This approach recognises the diversity of the banking sector and allows institutions to leverage their internal expertise. But banks opting for the IMA must ensure their models are robust, transparent, and regularly validated. The challenge lies in balancing the flexibility of the IMA with the rigorous standards set by regulators through the requirement of backtesting and P&L (Profit & Loss) Attribution Test (PLAT).

- **Navigating the SA-IMA dichotomy:**

  For many banks, choosing between the SA and IMA is not straightforward. It requires a thorough assessment of their internal capabilities, the nature of their assets, and their risk appetite. Some banks might opt for a hybrid approach, using SA for certain desks and IMA for others. Navigating this dichotomy requires strategic foresight and a deep understanding of the regulatory landscape. The bank should do cost-benefit analysis of selecting either the SA or IMA approach in terms of higher capital charge under the SA approach viz-a-viz higher system and human capital cost under IMA.

Comparative analysis of NPR's Standardised approach (SA) vs Internal models approach (IMA).

| Feature | Standardised Approach (SA) | Internal Models Approach (IMA) |
|---|---|---|
| **Foundational principle** | Relies on regulatory-set standards to compute capital charges | Utilises internally developed models to compute capital charges |
| **Scope** | All banks must calculate and report under SA | Only available to banks that meet rigorous criteria and obtain regulatory approval |
| **Methodology** | Pre-determined risk weightings and formulas applied uniformly | Bank-specific models tailored to individual trading books and risk profiles |
| **Data requirements** | Standardised datasets, less granular | High granularity datasets with a focus on historical price movements |
| **Risk factor modellability** | Standard risk factors with no differentiation on modellability | Differentiation between modellable and non-modellable risk factors, the latter incurs capital add-ons |
| **Model approval and maintenance** | No explicit model to be approved | Requires periodic regulatory approval, ongoing validation, and backtesting |
| **Operational complexity** | Less operational complexity; mostly plug-and-play | Requires expertise in model development, maintenance, and validation |
| **Sensitivity to market dynamics** | Less sensitive due to standardised nature | Highly sensitive due to its reliance on bank-specific models |
| **Risk factor coverage** | Broad market risk factors, may not cover bank-specific risks | Comprehensive; allows capturing of a wider range of risks, including bank-specific |
| **P&L attribution test** | Not applicable | Essential test to compare modelled risk factors against actual daily P&L |
| **Backtesting** | Not applicable | Mandatory; models are backtested against actual returns to ensure their accuracy |

| Feature | Standardised Approach (SA) | Internal Models Approach (IMA) |
|---|---|---|
| **Non-modellable Risk Factors (NMRF)** | Implicitly covered within the standardised framework as part of RRAO computation | Explicit capital charges for NMRF; requires banks to identify and manage them |
| **Capital consistency** | Provides consistent capital across banks | Capital requirements might vary across banks due to differences in models |
| **Flexibility in risk management** | Limited flexibility due to fixed rules | Greater adaptability allowing banks to align models and risk factors closely to their risk management practices and data availability |
| **Regulatory oversight** | Lower, as it's based on pre-set calculations | High oversight due to the complexity and variability in models; frequent regulatory interaction will be required |
| **Reaction to market stress** | Slower adaptation to market changes | Quicker adaptation due to dynamic modelling, but can lead to an increase in capital requirement in volatile times |
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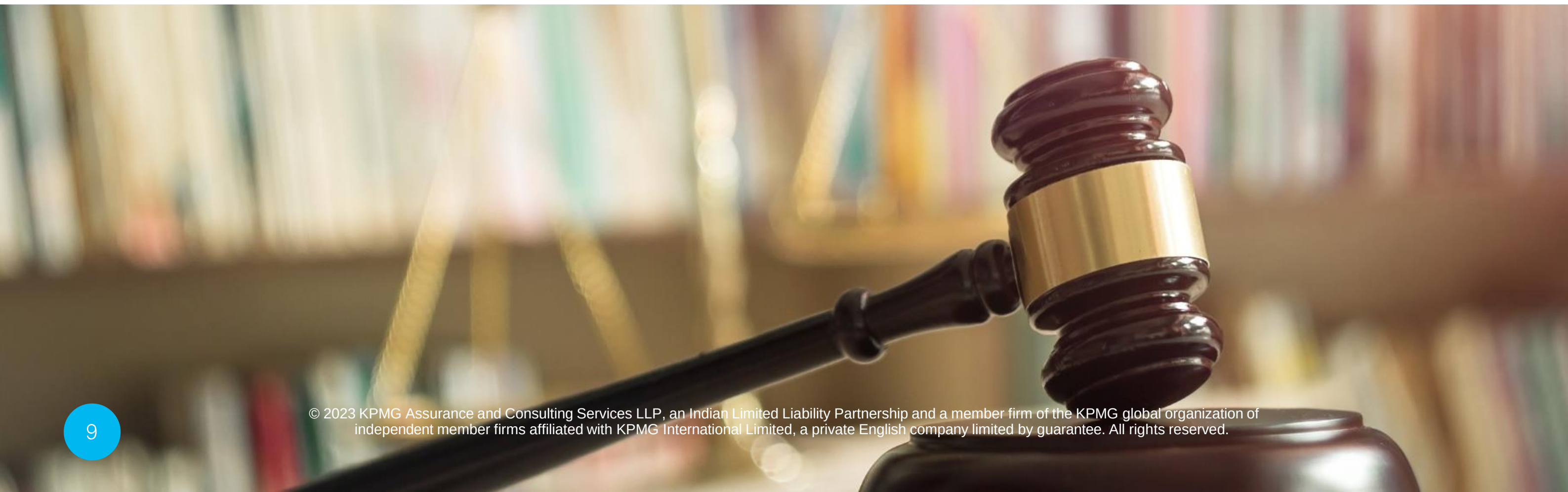


## Data challenge in the implementation of IMA:

**The intricacies of RFET:**

### RFET: A paradigm shift in risk management

The Risk Factor Eligibility Test (RFET) represents a significant departure from previous risk management practices. By emphasising real price observations and setting stringent criteria for risk factors, the RFET aims to bring more transparency and objectivity to the risk assessment process. This shift underscores the regulators' commitment to grounding risk assessments basis empirical data rather than theoretical models using proxy data which may not be relevant to the inherent risk of the product.

### Data challenges in RFET implementation

One of the most formidable challenges banks face in RFET implementation is data acquisition. The RFET's criteria demand large historical granular data of high-quality. For many banks, especially those operating in less liquid markets or dealing in complex financial products, sourcing high-quality granular data for such a long historical period can be a herculean task. The challenge is not just quantitative but also qualitative, as the data must meet the RFET's rigorous standards set by the regulator.

### Vendor reliance for historical data and subsequent implications

The complexities of RFET have led many banks to rely heavily on data vendors. While vendors can provide high quality historical data and insights, over-reliance on a few major players can pose systemic risks. Also, banks will still have to ensure data accuracy, and should validate vendor methodology related to collection and storing of historical data.

### Strategies for successful RFET implementation

Given the challenges of RFET, banks need to adopt proactive strategies. This might include investing in data infrastructure, forging partnerships with reliable vendors, and regularly validating and updating their risk models. Training and upskilling staff, especially in data analytics and risk modelling, can also play a pivotal role in successful RFET implementation.

In the face of evolving financial landscapes and regulatory challenges, banks have displayed adaptability by developing innovative modelling techniques. These techniques, while offering solutions to the challenges posed by the FRTB, come with their own set of intricacies. Below is a detailed list of various modelling techniques that banks can deploy to navigate these complexities effectively.

**Some innovative modelling techniques to overcome RFET challenges and their implications:**

In the face of evolving financial landscapes and regulatory challenges, banks have displayed adaptability by developing innovative modelling techniques. These techniques, while offering solutions to the challenges posed by the FRTB, come with their own set of intricacies.

| Optimal risk factor proxy | Risk factor decomposition | Risk factor bucketing | Parameterisation |
|---|---|---|---|
| Using proxies for risk factors that might be overlooked due to insufficient observable price data ensures a comprehensive risk profile. However, the challenge lies in ensuring that these proxies accurately represent the original risk factors. The selection of appropriate proxies requires a deep understanding of market dynamics, liquidity considerations, and the underlying risk factors they represent. | Decomposing risk factors into modellable and non-modellable components offers a clearer understanding of the risk profile. This not only ensures better alignment with P&L movements but can also lead to significant capital savings. The challenge here lies in the accurate decomposition of risk factors, ensuring that each component is representative of the underlying market dynamics. | The FRTB's flexibility in RFET allows banks to tailor their risk modelling to their unique needs. This approach, while offering customisation, requires banks to strike a balance between granularity and over-simplification. The selection of appropriate buckets, based on liquidity, market dynamics, and other factors, is crucial to ensure accurate risk assessments. | Expressing complex risk factors as orthogonal parameters can simplify the risk profile. However, this approach requires rigorous validation to ensure that the simplified parameters still accurately capture the underlying risks. The challenge here lies in the selection of appropriate parameters, ensuring that they are representative of the underlying risk factors and market dynamics. |

Below is a detailed explanation of the techniques mentioned above-

**Risk Factor Proxy:** The FRTB framework offers a pathway for banks to utilise substitute representations, known as proxies, for certain risk factors when direct market data is sparse.

- **Proxy utilisation under FRTB:** The FRTB framework endorses the adoption of proxies when direct market observations for specific risk factors are lacking. The overarching aim is to diminish the count of risk factors labeled as non-modellable, thereby curbing associated capital implications. This is realised by associating hard-to-model risk factors with those that are more easily modeled and bear resemblance in behaviour.
- **Historical context of proxies:** Historically, banks have incorporated proxies within their risk assessment models, specifically in Value at Risk (VaR) computations. However, the FRTB introduces more stringent guidelines governing the deployment of these proxies that can be used to compute Expected Shortfall (ES).
- **Guidelines for proxy deployment:** A suitable proxy should mirror the inherent traits of the risk factor it is meant to represent. Additionally, the selection of a proxy should be grounded in sound theory, be logically coherent, and demonstrate statistical alignment with the risk factor. Also, it is crucial that the proxy does not downplay the inherent volatility. Lastly, the proxy should be adept at capturing the interplay among various risk factors and should encompass both broad market dynamics and specific, unique risks.
- **Implications of inadequate proxies:** If a proxy falls short in capturing unique, specific risks, banks might find themselves facing additional charges pertaining to Non-Modellable Risk Factors (NMRF).
- **Inherent challenges in proxy adoption:** A pivotal challenge in proxy adoption revolves around its alignment with the Profit and Loss Attribution Test (PLAT). The theoretical risk-driven profit and loss computations should be in harmony with the risk factors used in assessing potential losses. Substituting a pivotal risk factor with a proxy might introduce discrepancies in profit and loss calculations, jeopardising compliance with PLAT.

The journey of integrating proxies is not without its complexities, demanding significant investment in terms of time and resources.

**Risk factor decomposition:** To sidestep potential issues with the Profit and Loss Attribution Test (PLAT) when using proxies, a strategy can be used which involves dividing Non-Modellable Risk Factors (NMRF) into two parts: a component that can be modeled and another component that remains non-modellable. The latter is subject to charges based on the stressed expected shortfall (SES). This division permits the use of the original risk factor or a combination of the proxy and the non-modellable part in risk-theoretical profit and loss calculations, ensuring it aligns more closely with hypothetical profit and loss figures.

- **Example:** Consider bonds that are not frequently traded, making their credit spreads hard to pinpoint. Such spreads might be categorised as NMRFs. The FRTB framework suggests breaking down these spreads into two types of risks: systematic (general market risks) and idiosyncratic (specific to the bond). The general market risk can be represented using a relevant liquid credit index. As a result, only the specific risk, or the 'basis', is treated as NMRF, leading to capital conservation. A similar approach can be applied to equities, breaking them down into general and specific equity risks using multifactor models.
- **Practical analysis:** In a study, an equity portfolio was examined that had a significant investment in a particular equity and was hedged using an index put option. This specific equity was deemed non-modellable, resulting in a high capital charge for the portfolio, especially when compared to the overall equity risk in the portfolio. This was due to constraints in offsetting the risk for NMRF.

  Given the significant impact of this specific equity on the portfolio's profit and loss, using a general equity index as its proxy could lead to significant mismatches in profit and loss calculations, risking PLAT discrepancies. To address this, the specific equity NMRF was divided into its general and specific risks. The general risk was represented using a broad market index that closely mirrored the NMRF equity's behaviour. The difference between the index and the equity, termed the 'basis', represented the specific risk. This was determined using linear regression techniques.

  By adopting this strategy, the broader market risk was hedged using the market index put option, leaving only the 'basis' to be charged under NMRF SES. This approach led to a significant reduction in capital charges compared to the original scenario. The reduction in the expected shortfall was primarily due to the offset between the divided index from the specific equity and the index put option. The SES charge was applied only to the specific component, which was lower charging the non-modellable equity.
- **Broader application:** This method of breaking down risk factors can be applied to other areas as well. For example, a yield curve that is hard to model can be split into a component that can be modeled and a non-modellable part. This strategy is particularly effective in scenarios where it is beneficial to offset risks between modellable and non-modellable components.

**Risk factor bucketing:**

- **Risk models and granularity:** Risk assessment models often rely on volatility surfaces and yield curve risk factors. These factors are usually broader in scope compared to the detailed ones used in front-end pricing models. While adding more detail (or granularity) to these factors can enhance their performance in the Profit and Loss Attribution Test (PLAT), it also means more risk factors need evaluation under the Risk Factor Eligibility Test (RFET). Finding Reliable Price Observations (RPOs) for the less frequently traded segments of the yield curve or volatility surfaces can be challenging. This can lead to an increase in Non-Modellable Risk Factors (NMRFs) and the related capital requirements.
- **FRTB's bucketing approach:** The FRTB framework introduces a 'bucketing' method for points on surfaces and curves when assessing them for RFET. Banks have the flexibility to use all the RPOs assigned to a specific bucket to determine if it meets the RFET criteria for any risk factors within that bucket. Banks have two main choices when it comes to this bucketing method.
  - Custom bucketing: Banks can create their own defined buckets but must adhere to certain guidelines.
  - Regulatory bucketing: Here, banks are required to use a predefined set of buckets for curves and surfaces.
- **Determining bucket granularity:** The detail or granularity of these buckets depends on the significance of the risk factor and the intricacy of the trading book. For instance, in a straightforward trading book where volatility is not a primary concern, banks can opt for broader points on the volatility surface using the custom bucketing method. However, it is essential that the granularity is adequate to account for Profit & Loss (P&L) fluctuations as gauged by the PLAT. Therefore, banks should weigh the pros and cons of different bucketing strategies to minimize the count of NMRFs.
- **Impact of NMRF on buckets:**

If any bucket on a curve or surface is labeled as NMRF, the subsequent Stressed Expected Shortfall (SES) charges can be substantial. This is particularly pronounced when there are counteracting risks spread across the surface or curve. Further discussions will delve into how parameterisation can aid in managing these NMRF-related charges.

## Data & systems impacted:

Data changes required:

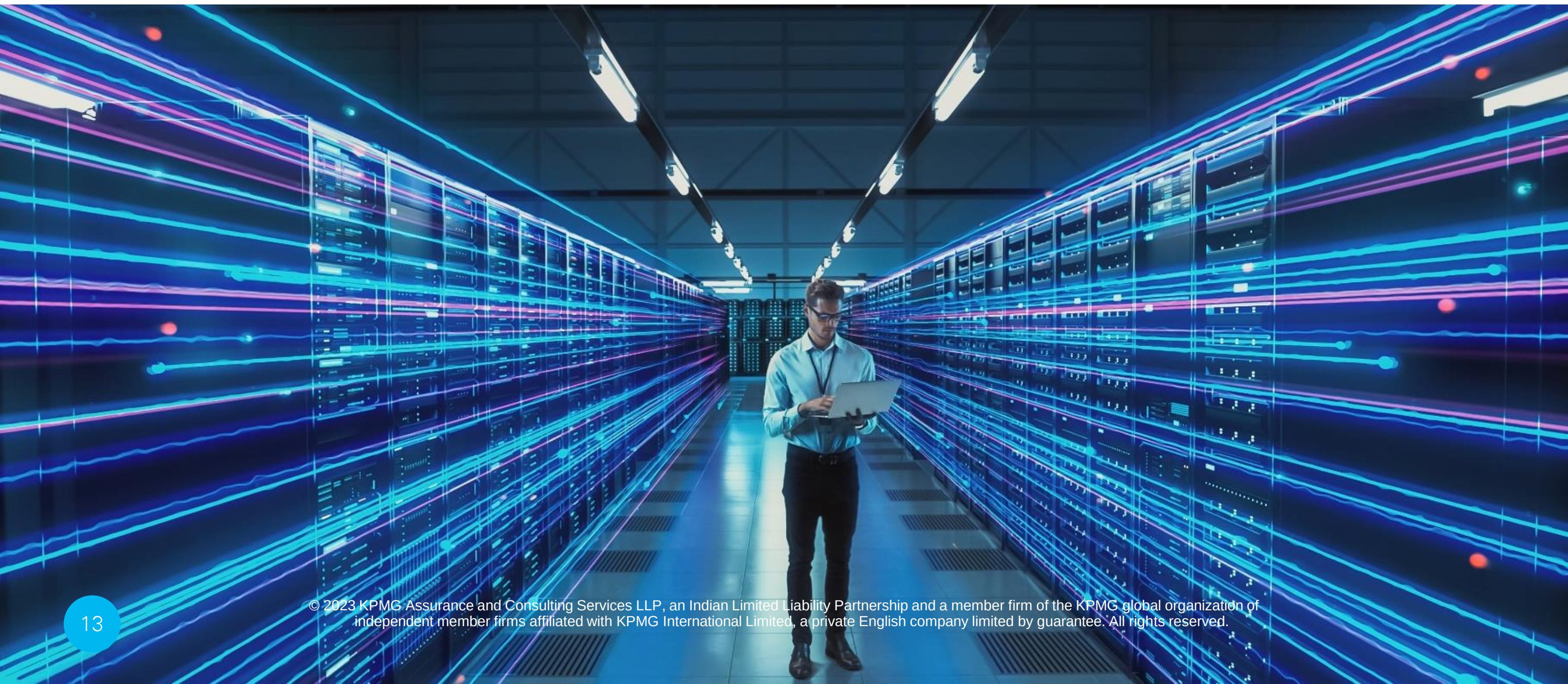
1. Historical data collection: Collect data from the early days of the financial industry to understand the evolution and draw meaningful insights for future risk models.

2. Observable market prices data: Systems must capture real-world transaction data in line with the FRTB's IMA framework. This may involve gathering high-frequency trading data or aggregating data from multiple sources to achieve a comprehensive overview.

3. Risk factor eligibility Test (RFET) Data: Accumulate data that satisfies the RFET criteria, including data related to frequency, liquidity, and observable market prices.

4. Global implementation data: Gather and continuously update data on FRTB implementation timelines and rules across different global regions.

5. Innovative modelling techniques data: Update systems to process and analyse new modelling techniques. This will require data on risk factor proxies, decompositions, and parameterisation.



## System changes required:

| | |
|---|---|
| 01 | **Modelling evolution:** Systems need to evolve from relying solely on rudimentary tools to leveraging advanced quantitative models that use mathematical and statistical methods. |
| 02 | **Real price observations processing:** Implement systems capable of processing and analysing real price observations as emphasised by the FRTB's IMA framework. |
| 03 | **RFET system capabilities:** Systems must be able to determine whether risk factors meet the RFET criteria. This might involve new algorithms to filter out non-compliant data or tools to monitor data quality closely. |
| 04 | **Flexible data interpretation:** Given the variances in FRTB rules across different regions, systems must be adaptable to cater to regional nuances, ensuring that banks remain compliant with local regulations. |
| 05 | **Vendor data integration:** Systems will need capabilities to integrate data from multiple vendors, especially if banks are to rely on external sources for RFET-compliant data. |
| 06 | **Enhanced backtesting capabilities:** With the introduction of the aggregate trading portfolio backtesting capital multiplier, systems must have robust backtesting functionalities. This would ensure that models remain accurate and reflect real-world outcomes. |
| 07 | **Advanced analytics for innovative techniques:** As banks employ innovative modelling techniques, their systems must support advanced analytics to interpret and utilize data from new risk factor proxies, decompositions, and parameterisations. |

### Conclusion:

The confluence of standardised and internal model approaches in NPR represents a new chapter in market risk management. Aligning with global benchmarks such as FRTB is pivotal for institutions, emphasising both transparency and innovation. The evolving landscape urges banks to showcase agility, precision, and a well-devised strategy to navigate these regulatory challenges. When considering factors like a bank's portfolio intricacy, the availability of premium quality data, and the associated human and system costs, our stance leans towards the IMA approach. While this approach might lead to reduced capital charges, it's crucial for banks to establish mechanisms to gather historical data, ensuring that models can effectively pass PLAT, backtesting and adhere to RFET criteria without an excess of non-modellable factors

# Acknowledgements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