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Meeting with US Agencies – FRTB / CVA

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NMRF/RFET | Different Approaches for Dealing with RFET (I/II)

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Different Approaches for Dealing with RFET

There are two proposed solutions to address issues with RFET:

- **Version 1:** Modify the minimum number of required RPOs to be a function of the liquidity horizon (LH) level specified in the ES table[1] of the US NPR for the given risk factor category (i.e., $minimum\ number\ of\ RPOs = \left\lceil \frac{250}{LH} \right\rceil$). SES is retained for any other risk factors that do not meet the minimum RPO requirement.
- **Version 2 (industry-preferred):** Modify the minimum number of required RPOs to be a function of the LH with the minimum level specified in the ES table[2] of the US NPR for a given risk factor category but can be increased up to 120 days for the given risk factor at the bank's discretion. SES is retained for any other risk factors that do not meet the minimum RPO requirement.
    - Version 2 is a logical extension of Version 1. It improves consistency by reducing the likelihood that risk factors in buckets with lower minimum LH are more likely to fail RFET than those in buckets with higher minimum LH.
    - Refer to the appendix (slide 8) for survey results supporting the need for Version 2. The survey indicates that many NMRFs are, in fact, risk factors with shorter-dated LHs.
- In the US NPR, § __.215(b)(11)(i) prescribes the minimum LH that a given risk factor. The industry stresses that it is important that a bank should have discretion to increase the LH for a given risk factors beyond the minimum up to 120 days.
- Note that in order for a risk factor to be included in the ES calculation, banks would need to demonstrate that the relevant time-series data pass the data principles in § __.214(b)(7).

[1] See TABLE 2 TO § __.215 in the US NPR

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Different Approaches for Dealing with RFET

Example: Consider an illiquid risk factor (with 8 RPOs) hedged with a liquid risk factor (with 30 RPOs). Assume both have a minimum LH of 20 days, as specified in the ES table[2] of the US NPR for this given risk factor category.

Version	RFET	ES	SES
Version 1	Min RPO requirement for 20−day LH: • $\frac{250}{20} = 12.5$ **Liquid RF passes RFET; illiquid RF fails**	Liquid RF included in ES with 20-day LH. Under the US NPR, the illiquid risk factor can be included to prevent broken hedges. **ES = basis risk at a 20-day LH**	Illiquid RF included in SES as an NMRF; liquid RF is not. **SES = unhedged risk exposure from illiquid RF**
Version 2	Min RPO requirements: • For 20-day LH: $\frac{250}{20} = 12.5$ • For 40-day LH: $\frac{250}{40} = 6.25$ **Liquid RF can be included in ES with 20-day LH; illiquid RF can be included in ES with 40-day LH**	To avoid broken hedges with the illiquid RF at 40-day LH, the bank can choose to increase the LH for the liquid RF to 40 days. **ES = basis risk at a 40-day LH**	**Neither RF is included in SES**

Comparing the two versions:

- Version 2 produces a higher ES by a factor of $\sqrt{2}$, but version 1 includes unhedged P&L from the illiquid risk factor in SES. Effectively, version 2 allows realizing full hedging benefits at a consistent (and higher) LH of 40 days, ensuring no risk factor remains unhedged.

Note: *Banks might also have the option to decompose the illiquid RF into another liquid RF and model the basis as a separate basis RF. In this case, under version 1, the ES calculation would represent the basis risk between the liquid risk factors with 20-day LH, while SES would include exposure of the basis RF. Under version 2, the capital outcome would be comparable as outlined above.*

[2] See TABLE 2 TO § __.215 in the US NPR

NMRF/RFET | Operational Considerations

Operational Considerations

- In order to calculate ES, banks must compute each sub-components ES_{LH_i}. For each sub-component, banks need to determine which risk factors are included. Since each such calculation requires a subset of risk factors defined by asset class and LH, banks need to:
  - Map each risk factor to its minimum LH based on its asset class and risk factor category, as specified in the ES lookup table in the US NPR.
  - Optionally apply an adjustment to the LH for risk factors underlying positions with shorter maturities than the prescribed minimum liquidity horizon. Note that such a LH adjustment is at a more granular level than at risk factor level (i.e., instrument level).
  - Apply the ES aggregation formula once all sub-components are calculated.
- To apply the above procedure correctly and consistently, banks must build the capability to set the liquidity horizon for each individual risk factor within the ES computation and in some instances, actually determine this at a more granular level (i.e., instrument level). As such, increasing LH at the risk factor level does not introduce additional capabilities or data requirements.
- Similarly, to identify NMRFs, banks must build the capability to identify applicable RPOs and run the RFET for each risk factor (notwithstanding bucketing rules).
- Given these requirements, the operational complexity of calculating ES and SES is substantially similar across the versions of ES/NMRF/RFET in the July 2023 US NPR and the recently discussed versions of RFET.
- Under the recently discussed approaches, some risk factors shift from NMRF to ES, but the process of mapping risk factors to LHs and identifying RPOs remains unchanged. Once mapping is complete and NMRFs are determined, the remaining steps involve standard computation using ES LH adjustment capabilities, which will be built regardless for the reasons mentioned above.

NMRF/RFET | Example Showing Risk is Appropriately Captured with Extended LHs

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Example Showing Risk is Appropriately Captured with Extended LHs

Here, we illustrate that risk is captured appropriately even when the risk factor is capitalized as modellable with extended LH, using an example of offsetting risk factors:

- RF_1 (Modellable risk factor): Long $100mm short-dated power
- RF_2 (Non-modellable risk factor with 8 RPOs): Short $100mm long-dated power
- The calculation leverages decomposition of the non-modellable risk factor into a modellable component and basis
- The original LH is 20 days for both risk factors; under RFET alternative (i.e., Version 2), the LH for RF_2 becomes 40 days and RF_2 is considered modellable
- Version 2 produces higher capital than under SBM but captures the basis risk appropriately

Justification for Version 2:

- Increased LH allows us to capitalize the original NMRF, which under the lower LH has transitioned to modellable with the higher LH. As a result, the position is well-capitalized under the increased LH.
- When moving from SES to IMCC, an additional 1.5 multiplier is applied to the original exposure. This further supports conservative capitalization of the risk on top of the higher LH.

Calculation	1.5*IMCC ($MM)	SES ($MM)	Total ($MM)
FRTB IMA (Status Quo)	52	18	69
FRTB IMA (Version 1)	52	18	69
FRTB IMA (Version 2)	60	0	60
FRTB SBM			38

NMRF/RFET | Hypothetical Portfolio Analysis (I/II)

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Hypothetical Portfolio Specifications

- **Objectives:** Using a realistic hypothetical portfolio, compare the different versions of RFET and secondarily, see the impact using different NMRF rho values.
- Given the limited amount of time since discussion of these recommendations commenced, a comprehensive quantitative study was not possible. Instead, we engaged a third-party to perform analysis on a realistic hypothetical portfolio to assess the impact of different RFET approaches.
- The hypothetical portfolio consisted of two sub-portfolios, each containing multiple asset classes:
    - The **base sub-portfolio** included a mix of long and short positions across several asset classes: interest rate delta, interest rate volatility, equity spot, equity volatility, credit indices, foreign exchange spot, and foreign exchange volatility risk factors. In this sub-portfolio, all risk factors were assumed to be modellable.
    - The **extended sub-portfolio** expanded upon the base portfolio by incorporating additional risk factors, including exposure to more foreign exchange currencies, interest rate curves and volatility surfaces, credit indices, credit default swaps, and equity spot. In the extended risk factor set, the number of RPOs was simulated.
- Based on this framework, we ran RFET for both Version 1 and Version 2
- Under **Version 1**, we reduced the RPO requirements to be a function of the ES liquidity horizon level, keeping SES for failures of the RPO test.
- Under **Version 2**, NMRFs were reclassified into higher LH buckets based on the number of RPOs, keeping SES for failures of the RPO test.

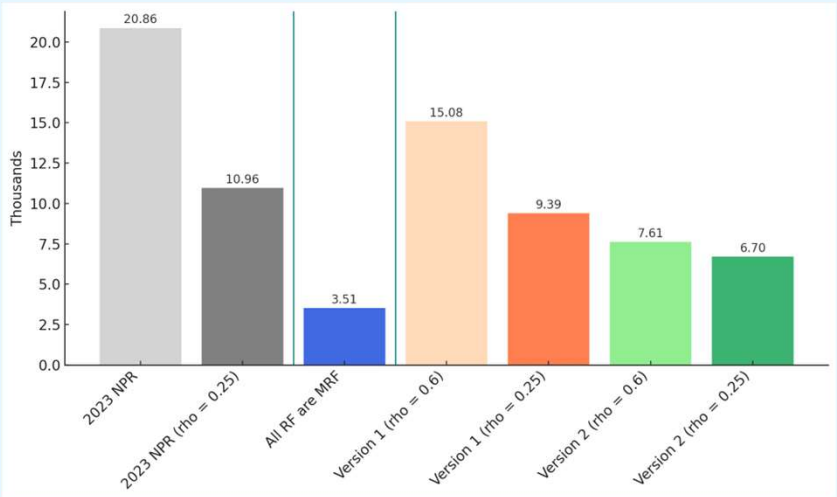
High-Level Findings

- Under the current US NPR rules, the ratio of NMRF to 1.5*IMCC is **5.82x**.
- Version 1 reduces this ratio to **2.29x** when NMRF rho equals 0.6, and to **1.05x** when NMRF rho equals 0.25.
- Version 2 further reduces the ratio to **0.46x** when NMRF rho equals 0.6, and to **0.28x** when NMRF rho equals 0.25.
- Therefore, we think **Version 2** best reflects the true risk from non-modellable risk factors.

NMRF/RFET | Hypothetical Portfolio Analysis (II/II)

Hypothetical Portfolio Results

Scenario Grouping	Scenario		1.5 * IMCC	NMRF	NMRF / (1.5 *IMCC)	Total	Increase versus 'All Modelable'
Current US NPR	**IMCC (MRFs) + SES (rho = 0.6 for NMRFs)**		**3,061**	**17,804**	**5.82**	**20,865**	**495%**
Current US NPR (with rho = 0.25)	IMCC (MRFs) + SES (rho = 0.25 for NMRFs)		3,061	7,901	2.58	10,962	212%
All RF are MRF	**IMCC (all RFs are assumed to be MRFs)**		**3,508**	**0**	**0.00**	**3,508**	**0%**
Version 1	IMCC (MRFs with relaxed RFET requirements based on reg LH) + SES (for reduced set of NMRFs)	NMRF rho = 0.6	4,582	10,500	2.29	15,082	330%
		NMRF rho = 0.25	4,582	4,807	1.05	9,388	168%
Version 2	IMCC (MRFs incl. NMRFs that go into higher LH bucket) + SES (for reduced set of NMRFs)	NMRF rho = 0.6	5,222	2,389	0.46	7,610	117%
		NMRF rho = 0.25	5,222	1,474	0.28	6,696	91%



Caveats

- The portfolio is intended to be realistic, but individual firms' results may vary significantly depending on their exposures
- In the absence of actual RPO data, a simplifying assumption was made regarding the distribution of transactions for each risk factor[3]
- The conclusions conform qualitatively with expectations
- Additional analyses with alternative portfolio configurations (and different RPO distribution assumptions) confirm that the qualitative conclusions hold

[3] A Poisson distribution was used to simulate the number of RPOs per risk factor where the expected observation rate was set to the regulatory liquidity horizon.

Appendix | RFET Survey Results

RFET Survey Results[4]

- Lack of observable market liquidity as required by RFET is one of the main challenges facing banks who want to adopt IMA under FRTB. RFET failures are common across a broad range of risk factors and maturities, even for many risk factors that would be associated with relatively liquid markets
- The risk factor groups exhibiting liquidity challenges include:
  - volatilities (ATM and ITM/OTM) for most risk classes across most maturities
  - long-dated interest rate yield curves (including G10 currencies)
  - inflation yield curves across all maturities
  - equity dividend and repo across all maturities
  - corporate credit spreads across all maturities
  - commodity spot and forward prices

	Short Dated (<2y)	Medium Dated (>2y, <10y)	Long Dated (>10y)
IR Yield Curve (G10)			
IR Yield Curve (Other)			
Inflation Yield Curve (G10)			
Inflation Yield Curve (Other)			
IR Volatility ATM (USD, EUR)			
IR Volatility ITM/OTM (USD, EUR)			
IR Volatility ATM (Other)			
IR Volatility ITM/OTM (Other)			
Inflation Volatility ATM			
Inflation Volatility ITM/OTM			
FX Volatility ATM			
FX Volatility ITM/OTM			
Credit Spread Curve (Sovereign)			
Credit Spread Curve (Corporate)			
Credit Spread Curve (Index)			
Credit Spread Volatility ATM (Single Name)			
Credit Spread Volatility ITM/OTM (Single Name)			
Credit Spread Volatility ATM (Index)			
Credit Spread Volatility ITM/OTM (Index)			
Equity Dividend			
Equity Repo			
Equity Volatility ATM (Single Name)			
Equity Volatility ITM/OTM (Single Name)			
Equity Volatility ATM (Index)			
Equity Volatility ITM/OTM (Index)			
Commodity Spot/Fwd Price			
Commodity Volatility ATM			
Commodity Volatility ITM/OTM			

[4] See Page 144 of *ISDA Responds to PRA Consultation on Basel 3.1 Implementation* (https://www.isda.org/a/hvJgE/ISDA-Responds-to-PRA-Consultation-on-Basel-3.1-Implementation.pdf)