FRTB-SA Implementation Case Study: Technical Analysis & Validation Report

ToC

1. Executive Summary

This report analyzes the implementation and validation of the Fundamental Review of the Trading Book Standardized Approach (FRTB-SA) at XYZ Bank. The project involved validating FRTB computations in the Murex system and prototyping python-based validation models for various financial products.

2. Project Overview

2.1 Background

- o Client: XYZ Bank (EU)
- o Implementation Partner: Qinetic Analytics LLP
- o Regulatory Framework: BCBS 2022 Guidelines (Minimum Capital Requirements for Market Risk)
- o System: Murex X3

2.2 Project Scope

- o UAT testing for FRTB computation in Murex system
- o Development of Python-based validation models
- o Documentation of toolkit methodology

2.3 Product coverage including:

- o FXFWD TARF
- o Interest rate swap with cap/floor
- o Cross Currency Swaps
- o Collared floater deposit
- o PRS/range accrual deposit
- o Structured deposits

3. Technical Implementation

3.1. Risk Classes Covered

1. General Interest Rate Risk (GIRR)

2. Foreign Exchange (FX) Risk

3. Equity Risk

4. Default Risk Charge (DRC)

3.2. Key Technical Components

3.2.1. GIRR Implementation

- o Factor model with 10 prescribed vertices per currency

o Multiple rate curves (SOFR, OIS, XIBOR, EONIA)
o Implementation of delta, vega, and curvature risk calculations
o Correlation structure handling for different vertices

3.2.2. FX Risk Implementation

o Base currency approach with translation risk consideration
o Implementation of weighted sensitivities calculation
o Bucket (Currency pair) level aggregation
o Correlation structure: 60% for all currency pairs

3.2.3. Equity Risk Implementation

o Coverage of equity spot prices and repo rates
o Implementation of bucket mapping based on:
  - Market capitalization
  - Economy type (Emerging/Advanced)
  - Sector classification
o Risk weight application ranging from 15% to 70%

4. Validation Results

4.1. Product-Specific Findings

4.1.1. FXFWD TARF

o Validated FX delta, vega, and curvature risk sensitivities
o GIRR delta validation successful
o Factor sensitivities and exposure aggregation validated across three correlation scenarios
o Bucket level capital charges (Kb & Sb) match with Murex X3

4.1.2. Cross Currency Swaps (CCS)

o Successful validation of FX & GIRR delta sensitivities
o Basis risk applied with zero correlation parameters
o Vega risk calculation confirmed as not applicable
o Results match Murex X3 generated numbers

4.1.3. IRS Range Accrual

o GIRR delta & vega sensitivities validated
o Curvature risk validation
o Bucket level charges match system calculations

5. Key Technical Achievements

5.1 Factor Sensitivity Calculations

o Successful implementation of sensitivity calculations across risk classes
o Accurate risk weight mapping and application
o Proper correlation structure implementation

5.2 Risk Aggregation

o Correct implementation of bucket-level aggregation
o Accurate application of correlation factors
o Proper handling of basis risk adjustments

5.3 Capital Charge Computation

o Accurate calculation of weighted sensitivities
o Proper implementation of diversification benefits
o Correct application of regulatory parameters

6. Implementation Challenges and Solutions

6.1 Technical Challenges

6.1.1 Data Integration

o Challenge: Integration of multiple risk factor sensitivities
o Solution: Implemented structured data model with clear mapping logic

6.1.2 Correlation Handling

o Challenge: Complex correlation structure across risk factors
o Solution: Developed matrix-based approach for correlation application

6.1.3 Performance Optimization

o Challenge: Computational intensity of risk calculations
o Solution: Optimized aggregation algorithms and parallel processing

7. Recommendations

7.1. System Enhancements

o Implement automated PV number tracking for curvature risk calculations
o Enhance basis risk correlation parameter handling
o Develop additional validation tools for complex products

7.2. Process Improvements

o Establish regular validation cycles for new products
o Implement automated regression testing for sensitivity calculations
o Develop comprehensive documentation for system maintenance

8. Conclusion

The FRTB-SA implementation at XYZ Bank demonstrates successful validation across multiple product types and risk classes. The system shows accurate calculation of capital charges with proper risk factor sensitivity handling. While some areas require additional development (such as curvature risk for certain products), the overall implementation meets regulatory requirements and industry standards.