

Fundamental Review of the Trading Book

FRTB SA

The Fundamental Review of the Trading Book (FRTB) is a new Basel committee framework for the next generation market risk regulatory capital rules. It is inspired by the undercapitalisation of trading book exposures witnessed during the financial crisis.

Fundamental Review of the Trading Book provides a clear definition of the boundary between the trading book and the banking book. It consists of an overhaul of the internal model approach (IMA) to focus on tail risk and an overhaul of the standardized approach (SA) to make it more risk sensitive. Each approach also explicitly captures default risk and other residual risks. Liquidity risk is explicitly included for different asset classes via liquidity horizons.

Fundamental Review of the Trading Book definition

- ◆ The Fundamental Review of the Trading Book (FRTB) is a new Basel committee framework for the next generation market risk.
- ◆ FRTB is inspired by the undercapitalisation of trading book exposures witnessed during the financial crisis.
- ◆ It aims to address shortcoming of the current Basel 2.5 market risk capital framework.

Fundamental Review of the Trading Book vs Basel 2.5

- ◆ Standardised Approach
 - ◆ Fundamental Review of the Trading Book
 - Sensitivity based risk charge + Default risk charge + Residual risk add-on
 - ◆ Basel 2.5
 - Standardised capital charge
- ◆ Internal Model Approach
 - ◆ Fundamental Review of the Trading Book
 - Expected shortfall + Default risk charge + Non-modellable risk factors
 - ◆ Basel 2.5
 - VaR + Stress VaR + Incremental Risk Charge (IRC)

Fundamental Review of the Trading Book Main Features

- ◆ Clear definition of the boundary between the trading book and the banking book
- ◆ An overhaul of the internal model approach (IMA) to focus on tail risk
- ◆ An overhaul of the standardized approach (sa) to make it more risk sensitive and explicitly capture default risk and other residual risks

Fundamental Review of the Trading Book approaches

- ◆ Standardized approach (SA): a regulator-set approach
 - ◆ Sensitivity-based risk charge (SBRC)
 - ◆ Default risk charge (DRC-SA)
 - ◆ Residual add-on (RAD)
- ◆ Internal model approach (IMA): a bank's own approach
 - ◆ Expected shortfall (ES)
 - ◆ Default risk charge (DRC-IMA)
 - ◆ Non-modellable risk factors (NMRF)

Fundamental Review of the Trading Book Standardized Approach

- ◆ 3 risk measures: Delta, Vega and Curvature
- ◆ 7 risk classes
 - ◆ General interest rate risk (GII)
 - ◆ Credit spread risk
 - ◆ Credit spread risk: non-correlated securitisation
 - ◆ Credit spread risk: correlated securitisation
 - ◆ Equity risk
 - ◆ Commodity risk
 - ◆ Foreign exchange risk

Fundamental Review of the Trading Book Standardized Approach (cont'd)

- ◆ Reporting hierarchy: portfolio, desk, bank

- ◆ Total risk charge

Total = sensitivity-based risk charge + default risk charge + residual add-on

- ◆ For example

An equity desk has equity risk and interest rate risk only, the total risk charge is given by

Total = equity Delta risk charge + equity Vega risk charge

+ equity Curvature risk charge + general interest rate Delta risk charge

+ default risk charge + residual add-on

Sensitivity Based Risk Charge

- ◆ Required sensitivities
 - ◆ Delta: the first order derivative with respect to underlying price
 - ◆ Vega: the first order derivative with respect to implied volatility
 - ◆ Curvature: equivalent to the sum of all high-order derivatives with respect to underlying price
- ◆ Sensitivity notes
 - ◆ Delta: all trading products have Deltas.
 - ◆ Vega and Curvature: only non-linear products (e.g., options) have Vega and Curvature.

Sensitivity Based Risk Charge (cont'd)

- ◆ Sensitivity calculation
 - ◆ Clearly define all Delta and Curvature calculation but not Vega.
 - ◆ Interest rate deltas are computed based on yield rates (or zero coupon rates) rather than liquid instrument quotes (e.g., swap rates, futures).
 - ◆ Curvature is a new measurement that is equal to shocked value change minus Delta.
- ◆ Bucket and risk factor
 - ◆ Sensitivities should be divided into buckets and risk factors within each risk measure and each risk class.
 - ◆ Risk weight: a risk weight is defined for each risk factor.
 - ◆ Risk correlation: correlations are specified between risk factors and between buckets.

Sensitivity Based Risk Charge (cont'd)

◆ Calculation

- ◆ Sum all sensitivities belonging to the same risk factor and then multiply by the risk weight → risk charge $W_i S_i$ per risk factor
- ◆ Within one bucket, two risk factor charges can be added as

$$K_b = \sqrt{(W_i S_i)^2 + (W_j S_j)^2 + \rho_{ij} W_i S_i (W_j S_j)}$$

- ◆ Within each class and each measure, two bucket charges can be added as a correlated sum
 - For example, an equity Delta risk charge has two buckets only, the Delta risk charge is given by

$$DeltaRiskCharge = \sqrt{K_b^2 + K_c^2 + \gamma_{bc} K_b^2 K_c^2}$$

Default Risk Charge

- ◆ Scope
 - ◆ Debt instruments
 - ◆ Equity products
 - ◆ Securitisation products
- ◆ Calculation procedure
 - ◆ Determine jump-to-default (JTD) loss amount
 - ◆ Offset the JTD amounts of long and short exposures with respect to the same obligor
 - ◆ Discount the net short exposures by a hedge benefit ratio
 - ◆ Apply default risk weights to exposures to arrive at the DRC

Residual Add-on

- ◆ The following trade types bearing residual risk
 - ◆ Traded in incomplete markets
 - ◆ Gap risk: such as path dependent options (barrier, Asian, digital, Bermudan, etc.)
 - ◆ Correlation risk: such as multiple underlying options (basket, best, spread, basis, quote, etc.)
 - ◆ Behavioural risk: such as mortgage
- ◆ Calculation
 - ◆ $RAD = \text{notional} * \text{factor} (1\% \text{ or } 0.1\%)$



Reference:

<https://finpricing.com/lib/EqBarrier.html>