Fast-track FRTB Compliance with Big Data Technologies

Abstract

The economic volatility of the past decade prompted the Basel Committee on Banking Supervision (BCBS) to propose new guidelines for market risk assessment. The Fundamental Review of the Trading Book (FRTB) sets out detailed proposals to reform the trading book by minimizing the arbitrariness involved in deciding if an instrument is to be assigned to the trading book or the banking book. This paper explores the impact of the revised guidelines on data management, specifically the increased data requirements for computation of market risk metrics and regulatory reporting, and suggests leveraging Big Data technologies to address the FRTB data management challenge.

The FRTB Data Challenge

In Jan 2016, the Basel Committee on Banking Supervision (BCBS) published the Fundamental Review of the Trading Book (FRTB) as the guideline for calculating the minimum capital requirements for market risk. Under the existing regulation, Value at Risk (VaR) is used to assess market risk, which does not adequately capture the credit risk arising out of trading exposures. Also, banks have the liberty to arbitrarily assign instruments to the banking book or the trading book, making it difficult for regulators to accurately assess banks' financial health and stability. But under the FRTB market risk framework, which is expected to come into force in 2019, a new parameter, expected shortfall (ES) will replace VaR, which will curtail banks' freedom to arbitrarily assign instruments to the banking book or trading book. As a result, the regulatory capital requirements will increase under the FRTB regime.

Compliance with the revised framework will heighten data demands on banks. Voluminous data will be required to support complex capital calculations and the higher frequency of regulatory reporting and analyses. FRTB guidelines require institutions to use 'real' prices for risk factors in their internal assessment models. Furthermore, classification of instruments, mandatory mapping of instruments to the appropriate book based on the exact purpose of the instruments, procuring prior regulatory approval for deviations, computation of ES, and so on will require granular data to be captured. Moreover, the dynamic nature of the trading book and the consequent changes in its risk profile necessitate frequent capture of data in real or near real time. Complying with FRTB is therefore a Big Data challenge – banks will need to manage huge volumes of varied data, generated continuously, while ensuring its veracity.

Volume: Processing huge amounts of granular data

FRTB will increase the number of calculations, which means that the corresponding number of market scenarios that banks will need to look at for each trade will increase as well. Moreover, capital charges have to be calculated at the more granular trading desk level unlike under the current regime where it is at an overall trading book level. These complex calculations require voluminous and granular data inputs. In addition, data for each trading desk needs to be collated to calculate the capital charge which will result in the generation of gigabytes of data. For managing such huge volumes of data, banks must consider using platforms like Hadoop or Spark. Grid computing tools can help address storage requirements

and provide the requisite processing power. Also, banks can use visualization techniques to limit the data points required for calculations.

Velocity: Managing the data deluge

Under FRTB, accurate calculation of capital requirement for pre-trade decisions and timely regulatory reporting mandate near real-time view of trades and market exposures. In addition, a model set of representative transactions and real prices must be considered for calculation and assessment of market risk capital. Under the internal model approach (IMA), banks will have to source market data for pricing risk factors for the capital calculation process. In the absence of pricing for a risk factor, a non-modellable risk factor charge will be added to the capital computation, which will increase the regulatory capital requirement. Under the standardized approach (SA) to capital calculation, banks must source market data to calculate risk sensitivities. Moreover, the regulation specifies that the data used for computation of 'greeks' under the SA approach must align with the pricing data used by the front office.

The instruments in the trading portfolio are to be marked to market (MtM), which means that banks will need to capture real-time prices for capital calculations. This means that data on prices will stream in as and when prices shift – this translates into massive amounts of data coming in continuously, at a fast pace. Traditional relational databases lack the ability to store voluminous data, validate, enrich, or act on data as it flows in, thereby limiting performance. Banks must replace the traditional batch processing system with Big Data solutions powered by NoSQL technologies that enable capture and process the floods of data as they arrive.

Variety: Handling diverse data requirements

The ES parameter replacing the VaR approach for market risk assessment will result in a change in the way credit value adjustment (CVA) is computed. Under ES, the process of computing risk parameters is more elaborate than under VaR. FRTB mandates bank assets to be classified into seven risk classes and such classification requires diverse data inputs for different risk classes. Also, certain classes of instruments like derivatives are nonlinear in nature and require diverse data spanning trade data, reference data and historical market data to be held for different risk classes. Evolving regulations will force banks to manage new types of data. However, assimilating this data and creating relationships between data points on a large scale in conventional data bases will entail

restructuring the model, which will prove expensive. Big Data tools have the capability to ingest, store, and access data, irrespective of type. This inherent flexibility of Big Data technologies enables easy ingestion of new data-points and quick and easy access at scale.

Veracity: Ensuring the quality and integrity of data

Firm-wide capital charges mandate integration of data feeds from multiple sources. Ensuring data quality across parameters like completeness, integrity, and accuracy, will require answers to questions like:

- Are the risk factors modellable?
- Can the modellable risk factor be demonstrated to the regulator?
- Can banks adopt IMA to lower their capital charge?

In the absence of data around a particular risk factor, they will be classified as non-modellable and banks will have to provide for add-on capital charges based on stress scenarios. In addition, banks that use IMA will need to compute capital charges under SA, as the regulation mandates that IMA capital be floored at the capital calculated under SA. Computing capital requirements under IMA and SA will require banks to ensure quality data that is accurate and complete in all respects to ensure the credibility of the end-to-end computation process. Algorithms specifically designed for data cleansing can be executed on Big Data warehouses; these algorithms ensure veracity by removing outlier data, which better aligns the data with the regulatory requirements for capital calculations. High computing power will be required to execute these algorithms to cleanse huge amounts of FRTB related data, and Big Data technologies provide the right platform.

Moving Towards Compliance

The FRTB regulation brings new challenges, especially in terms of the volume and variety of market data that needs to be captured to ensure compliance. In addition, the ready availability of quality data in a timely manner also plays a crucial part in ensuring FRTB compliance. There are many data management technologies available in the market that can enable seamless compliance with FRTB guidelines. But Big Data technology-based solutions are the most suited as they have the capability to scale to handle the volume, velocity, and variety as well as incorporate tools that ensure the integrity, quality and completeness of the data required for capital computation.

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