FRTB: Cloud-to-Cloud

Resolving the Challenges of Data Intensity and Computational Complexity

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Executive Summary

- FRTB poses significant challenges and a high cost for banks to implement if they use traditional approaches to on-prem market data infrastructure and risk calculations.
- FRTB’s calculation and data intensity demands put strain on existing data and risk infrastructure.
- Technological advances mean the traditional border between Basel’s Standardized Approach (“SA”) and Internal Model Approach (“IMA”) banks will blur – putting IMA capabilities within reach of smaller banks.
- Vector Risk and Asset Control provide best of breed, cloud-based risk calculation and market data integration solutions that; reduce the onboarding time and allow faster and cheaper processing for FRTB IMA calculations and data requirements.
- Using cloud-based technology to futureproof market risk infrastructure reduces the cost of (inevitable) future change with a predictable cost base.

FRTB and the changing face of market data and risk computations

The recently finalized new trading book regulation – FRTB – that is set to come into force January 2022 poses a number of challenges to banks’ market data infrastructure and risk computations. At the same time, FRTB offers banks opportunities to get a more granular handle on risk numbers and, through using IMA where appropriate and cost-effective, reduce their capital allocations and get a better sense of the underlying drivers of their capital numbers.

The challenges banks face include:

- Larger volumes of market data to process with sufficient context (‘real price’ data to prove modellability of a risk factor)
- An increase in computation requirements to produce the expected shortfall numbers
- Potentially integrating additional data sources from internal trading systems, trade repositories, broker feeds or data pools to limit the number of non-modellable risk factors.
- Longer histories of market data to keep pace with new data quality requirements
- Reference data requirements for the standardized approach to appropriately bucket risk categories.
- Increased demands on the process of data preparation and calculation, for example through the periodic reassessment of proxy suitability
- Increasing requirement for long histories of bitemporal time series data
- Enhanced data lineage requirements
Opportunity in shifting to cloud-based risk management services

Recent years have seen rapid development in technology with a direct impact on financial services. These revolutionary changes, including Cloud computing, High Performance Computing ("HPC") and Artificial Intelligence/Machine Learning, provide financial institutions with an opportunity to update and modernise their processes. This is especially true in risk management with its enterprise data nature, high data intensity, shortening turnaround times and process rigour demands.

In trading and derivatives operations, the complexity of instruments and the need for sophisticated risk measures to be calculated has often led to a two-tier marketplace:

- The global and large regional banks have utilised best-of-breed risk measures to manage their portfolios in a way that enables them to optimize the risk/return trade-off.
- Smaller regional and domestic banks, on the other hand, have frequently resorted to simpler standard methods that can lead to conservative over-estimates of risk with an unnecessary extra capital burden as a result.

Cloud technology and solution delivery providers such as Vector Risk will enable smaller banks to use more sophisticated approaches in a cost-effective way giving them access to the benefits of the highest level of risk management. This is particularly true in the FRTB (Fundamental Review of the Trading Book) regulations.

Typical for Basel Committee regulations, there is a Standard Approach (SA) and an Internal Model Approach (IMA). Previously, large banks would typically go with the IMA and smaller banks would almost by default put up with the SA as IMA was prohibitively expensive given their volumes. Cloud based solutions can change this divide as technological advances and new delivery methods bring the benefits of the internal model well within reach for smaller banks.

In many ways, the smaller banks have a huge advantage in moving to an IMA:

- They typically have a relatively vanilla portfolio of trades in relatively liquid instruments
- They often only have one trading location
- They often have only one or two trading systems meaning that extracting data, loading it into a cloud solution where the calculations take place and retrieving the results can be very easily done.

Cloud delivery also means rapid deployment of the solution, users have access to the Vector Risk software immediately to begin testing, planning and implementing.

In effect, any bank big or small, can access market data and Software-as-a-Solution risk measures very easily. With no need to worry about hardware, software installation, upgrades, keeping integration with external market data sources current or third-party licencing and IT environment support, this is a cost-effective and efficient way to calculate both SA and IMA for FRTB.
Benefits of running risk calculations in the cloud

The combinations of different liquidity horizons and risk factor categories require up to 63 different expected shortfall calculations putting greater strain on existing resources. Overall, risk management calculations require several key elements to be successful:

- Fast and effective implementation
- Fast and easy upgrades
- Data must be available and effectively managed
- Risk calculations must be accurate
- Risk calculations must be fast
- Complex sets of derived data need to be created and managed
- Large quantities of time series data need to be managed
- Re-runs and what-if scenarios must be viable
- Results must be transparent and easily available to multiple bank reporting processes

The combination of Asset Control data management expertise, allowing users to effectively manage the quality of data in and out of the system, and Vector Risk functionality and HPC capabilities guarantee that these requirements are met in a single solution. Cloud providers have invested huge resources into security, up-time reliability and disaster recovery so shifting data integration and risk calculations to a cloud-based platform will be a game-changer in the way banks meet their obligations.

Example: FRTB market data integration challenges

Market data management requirements for FRTB include the following:

1. Integration of market data sources with real price sources.
2. Mapping between front office instrument and the appropriate risk factor. This can include a proxy waterfall if there is no exact match. It can also include risk factor decomposition, for example decomposing a foreign currency bond into a currency risk factor, a risk-free rate factor, a sectoral credit spread and the idiosyncratic issuer risk.
3. Backfilling time series histories to 2007. 2007 backfilling is needed to qualify a time series as in the reduced set. At least 75% of the expected shortfall in the IMA needs to come from the reduced set. Regulators have issues if banks proxy too crudely.
4. Mapping instrument level data to risk factors. In this last bit there will be most variety from bank to bank.

The integration of market data with real-price sources can be complex depending on the breadth of sources and instruments. For example, market data vendors are preparing FRTB ready data packs for use in IMA calculations that meet the observability criteria. These data offerings come in different flavours adding to the complexity of data integration. For example, some data products provide a time series of transactions per instrument, others give a set of trade identifiers from a trading system whereas others provide a simple binary Y/N flag on having met the new RFET criteria. Banks need to be able to prove so need access to the underlying data either by warehousing it themselves or by securing a path to the underlying data from their data providers.

On top of these requirements, reference data needs to include information such as market capitalization, industry sector, credit ratings and commodity type. As this data can be kept in separate systems and can be sourced from different suppliers, it is important to cross-reference and standardize to common taxonomies to prevent inconsistent and inaccurate reporting.
Cloud marriage between data and calculations is now technologically possible

Historically, firms had a proliferation of sourcing channels and storage sites in financial data management. Constraints in speed of data transfer, performance limitations in on-line database, differences in data models and proprietary systems, and sometimes just political reasons translated into a large number of separate databases that independently sourced, integrated and mastered their own data. It is not uncommon for stress testing, product control, risk and different business functions to all have separate databases. This proliferation of data translates to high cost when new data or business logic needs to be onboarded and rules out solid data lineage and audit capabilities. Furthermore, it leads to inconsistency, operational risk and a huge cost overhead. More to the point, it is no longer needed thanks to technological advances.

Users require complete control and access to data from different sources both internal and external. Through different access options ranging from enterprise search, user interface, programmatic integration via REST services to native integration with Python and R, it can bring the users to the data boosting business user enablement and productivity.

For risk requirements such as FRTB where the SA requires substantial reference data for default risk charges, and the IMA requires observable and extensive time series of market data, this data can be managed very effectively in a single platform. The single platform for data management also means that applications like Vector Risk that perform risk calculations can integrate with a single API. This means external or internal rate and reference data can be accessed plus the bank’s trading positions can be uploaded and managed on the same platform allowing a seamless marriage between data and calculations.

This tight welding reduces the risk of noise, missed data points or other data quality issues. This is important since regulation increasingly comes with an explicit data quality framework. From a bank’s perspective, the use of Vector Risk and Asset Control will allow a powerful and effective risk solution to be accessed with minimal work required for integration or implementation. Risk projects can be done more quickly with lower operational complexity, lowerer (and more predictable) cost of change in the future, much reduced project risk and no specific hardware requirements. In effect, the bank is outsourcing the hardest part of any risk project and benefits from the efficiency gains immediately.

Other than the requirements listed above, firms also face new demands on backtesting. The price for inconsistency in valuation and risk numbers between front and middle office has gone up. However, many firms are very poorly prepared for these additional requirements since they have a scattered landscape of risk systems and market data sets. Unnecessary transport of data between different data stores leads to delays at best and to poor and patchy reporting at worst. Previously, many firms set up multiple staging databases and departments often had their own walled gardens to escape constraints in data access, data transfer or scalability. This has introduced operational risk and inconsistencies, complicating PLA, backtesting and clarity on data lineage.

Solution Scope – FRTB SA: Packaged rule sets for sensitivities and standard calculations

The FRTB SA is based upon the sensitivity of the portfolios to underlying risk factors such as interest rates, FX rates, equity and commodity prices. A solution that has these sensitivity definitions already in place ready to run enables the subsequent roll-up of these sensitivities into an aggregator that provides an SA capital figure. This includes the Default Risk Charge and any Residual Risk amounts that stem from exotic options and exotic underlying instruments. A bank only needs to provide trade or position data, managed and formatted appropriately by Asset Control, and a source for market data and reference data, internal or external, to be able to get FRTB SA results straight away. The Vector Risk solution provides GUI access for drill-down into results and what-if capabilities for troubleshooting unexpected numbers.

Should the bank wish to supply its own sensitivities, the Vector Risk solution can accept these and blend them in accordingly. This flexibility enables a bank to mix and match the required functionality from the Vector Risk solution to best fit the organisation’s capabilities and unique market differentiation.
The FRTB IMA is based on a series of simulation calculations – the Expected Shortfall risk measure, the simulated Default Risk Charge, and the simulation-based Credit Valuation Adjustment (CVA) sensitivities for CVA Capital. There are also very specific requirements for the quality and quantity of market data and reference data to support these calculations as discussed above.

The simulation-heavy FRTB IMA means that even relatively small portfolios will require good quality HPC solutions. Vector Risk has a decade of proven experience in HPC techniques and has a highly efficient vectorised pricing and risk analytics library to ensure the system can meet even the strictest performance requirements. For example, a 1 million interest rate swap portfolio FRTB IMA can be run in 30 minutes. This HPC capability enables users to drill-down into results and run meaningful what-if analysis in reasonable time. Consequently, risk managers can spend more time managing risk than managing calculations. The seamless mix of data management and FRTB functionality will revolutionise the regulatory risk framework for banks large and small.

Vector Risk Functionality

In summary, cloud-based risk management via Asset Control and Vector Risk gives you rapid implementation, seamless data management, high performance and accurate risk calculations, easy drill-down what-if analysis and easy distribution of results, all done in a scalable, safe and secure environment. It provides a scalable solution with reduced and more predictable cost of change and improved turnaround time for risk calculations and decision making.
Vector Risk is a global leader in providing high performance risk measurement on hosted cloud technology. Where many organisations have done a “lift and shift” of legacy software onto the cloud, Vector Risk undertook the building of a native cloud solution to take advantage of the new delivery, support and upgrade capabilities. As a result, our solutions have been recognised through awards and the backing of global partners.

We have deployments in cloud data centres in North America, Australia and Asia to support our existing customers and we will shortly be deploying in Europe.

Learn more at www.vectorrisk.com

Asset Control is the market leader in data quality software solutions for financial data. Focused on business user enablement, we help clients simplify complexity and ensure users across buy and sell side make the most of their data assets by providing easy data integration, data cleansing, distribution and data discovery solutions.

We service a blue-chip client base globally and our award-winning solutions provide rigorous processes to secure high-quality data, easy integration into business user workflows and a trusted environment for advanced analytics. Delivered through managed services, cloud or on-premise deployment, our highly scalable products help the world’s most successful financial institutions meet their risk management, valuation, security master and operational needs with mission critical reliability.

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