

FRTB AND THE NEXT GENERATION OF RISK FRAMEWORK DATA



CAPCO
THE FUTURE. **NOW.**

INTRODUCTION

The ability to apply accurate and relevant data is the key to unlocking future business benefits under the Fundamental Review of the Trading Book (FRTB) regime and the strengthening of the value-at-risk (VaR) framework for capital adequacy.

Among the many ambiguities of implementing the new regulation, internal modelling of market risk exposure is a well-known challenge across the industry. Without access to useful data, non-modellable risk factors (NMRFs) can result in suboptimal capital alignment with the underlying risks, which can undermine the viability of desk level internal models. In markets where data is scarce, sourcing quality market data will play a pivotal role in the difficulty of mitigating against non-modellable risk.

Introduced as a framework in 2016, the FRTB regime is planned for a phased rollout from 2022. The new approach utilizes an alternative method of measuring market risk using expected shortfall (ES) as the primary exposure measure instead of VaR, while also ensuring alignment of the front office desk models with market risk calculations for their internal models. FRTB represents the next generation of market risk regulatory capital rules for large, international financial institutions. WLT has also encouraged vendor solutions to develop alternative offerings that can help firms implement new risk management capabilities.

Many firms are investing significant time and effort to address these challenges as NMRFs can constitute a large proportion of the capital charges. As a result, Capco and Market Data Company have developed a set of methodologies and processes for identifying, evaluating, optimizing, and sourcing appropriate market data for risk management. We believe that these cornerstones are vital to ensuring ongoing robust risk management and capital adequacy framework. These components are relevant across all firms; whether they are looking to implement FRTB or raise the bar of their operating effectiveness and benefit from extended data and solution offerings.

WHY IS IT IMPORTANT NOW?

The FRTB builds on Basel II.5s theme of providing more attention to managing credit risk exposure and reducing the market risk framework's cyclical nature by setting higher capital requirements. In 2018, the 'industry' – represented by the International Swaps and Derivatives Association (ISDA), the Global Financial Markets Association (GFMA), and the Institute of International Finance (IIF) – emphasized where FRTB would ultimately impede on market-

making activities and the operational fluidity of the global capital markets¹. These negative impacts could result in an emergence of rising trading costs when executing transactions, potentially leading to a reduction in overall market liquidity, which (ironically) could ultimately reduce the volume of transactional data available for risk factor price verification.

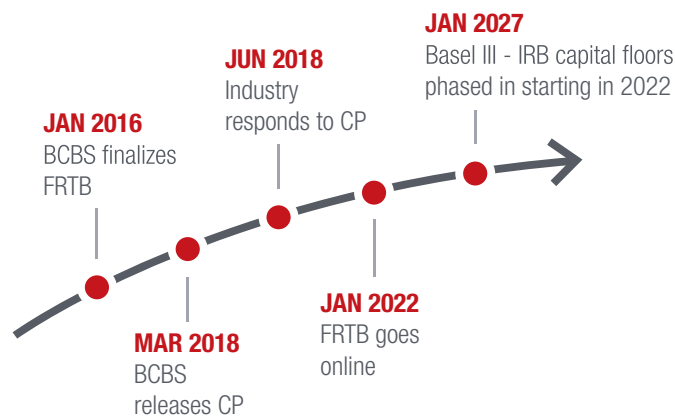


Figure 1: Implementation Timeline

Source: Bank for International Settlements (BIS), International Swaps and Derivatives Association (ISDA), International Capital Market Association (ICMA).

In 2019, the industry is continuing to prepare for the regulatory impacts, and there are many trends which are shaping the next generation of market risk regulations.

G-SIB's preparing for FRTB compliance

Global Systemically Important Banks (G-SIB) are already well underway with their FRTB implementation programs, by enhancing both the standardized approach (SA) and the internal model approach (IMA). Investment banks generally prefer expected shortfall (ES) over VaR because of VaRs inability to increase as portfolios are diversified. The top five North American banks (by market capitalization) are JPMorgan Chase & Co., Bank

of America, Wells Fargo, Citi, and Royal Bank of Canada, and they make up a combined market value of 1.25 trillion². Identified from their annual reports, each measured VaR at the 99 percent confidence level for price movements over a one-day holding period. In aggregate, we find they are mostly exposed to interest rate risk and credit risk on an average annual basis of 28 percent and 25 percent, respectively (Figure 2).

Market Risk Weights

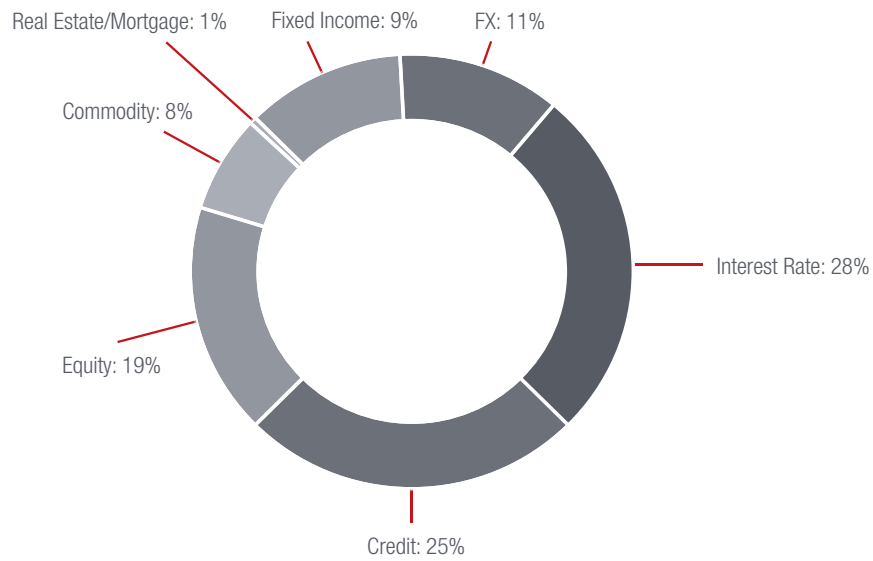


Figure 2: Market Risk Weights

Source: Bank's annual and quarterly reports (JPMorgan Chase & Co., Bank of America, Wells Fargo, Citigroup and Royal Bank of Canada)

Overall market risk exposure has been gradually falling, with the total average annual market risk VaR across the top five banks being reduced by 31 percent from \$590 million in 2013 to \$403 million in 2018 (Figure 3)³. Many financial institutions are still voicing their concern regarding stricter capital requirements in conjunction with increased compliance costs reducing profits.

Average Annual Market Risk VaR³

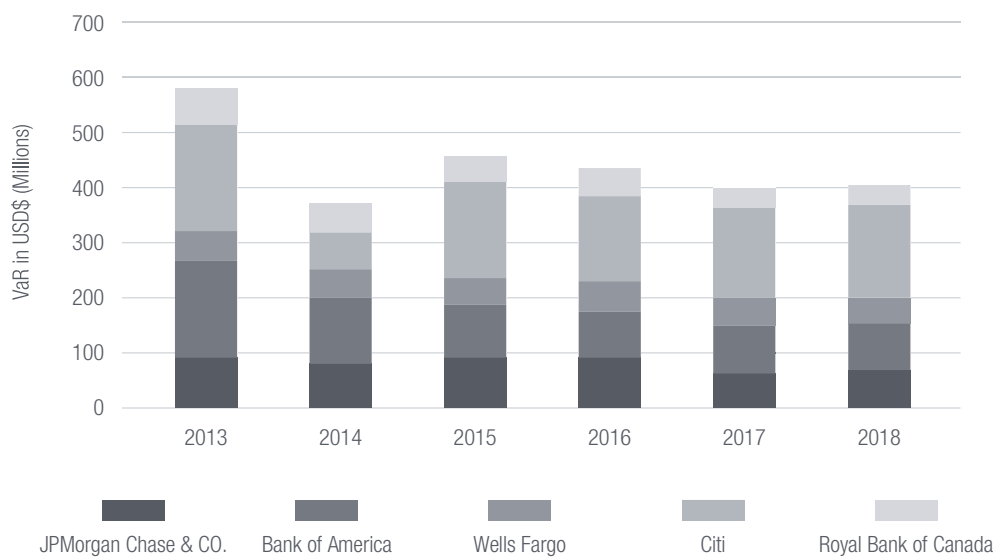


Figure 3: Average Annual Market Risk VaR

Source: Bank's annual reports³

Niche product data opportunities

As a direct result of the capital cost penalties planned for products with non-modellable risk factors, firms are focusing their attention on reviewing their product coverage. To make sound business sense, the cost of transaction execution needs to be sustainable. Smaller, niche and boutique firms are potentially able to take a more significant market share of trading for products with high NMRF impacts, as a result of the more stringent capital adequacy impacts for G-SIBs.

For firms, their drive is to primarily manage ‘tail risk’ for market stability purposes and optimization of their capital utilization for profitability. In the future, there may be fewer players executing on illiquid or highly non-modellable products. In turn, the reduced availability of modellable price verification points will potentially make transaction data more valuable to vendors. This is opportunistic for those who wish to sell their data for the growing suite of vendor offerings.

Extension of vendor offerings

As a direct consequence of FRTB, vendors have been eager to develop and monetize products to companies struggling to implement the full suite of data and lack computational capacity and ongoing monitoring tools. All firm types are implementing solutions, as they begin to recognize the operational and financial benefits of more effective market risk management. Niche execution houses that are not G-SIBs are often capital constrained and are investing in end-to-end platforms with embedded data, modelling and reporting capabilities. Firms are looking at top-down data providers to support tooling, as well as bottom-up technology services to access data within a flexible platform. Regardless of approach, one rule stays true - accessibility to accurate data remains key to success.

These stricter requirements place a higher burden on accurate and effective risk modelling, despite ongoing challenges to the procurement of quality data sets, especially regarding illiquid assets and NMRFs.

Due to a liquid market, a vast majority of FX risk factors should pass the risk factor eligibility test (RFET), such as highly liquid yield curves. However, banks are likely to run into problems when it comes to those longer-dated, medium to low liquid yield curves, such as PNL – WIBOR – 1Y. The extension of the observation period in the final rules had little effect on increasing the modellability of rates products, so banks can benefit from ensuring that they focus on this product class as a priority. The credit derivatives market has been diminishing since 2009, and as a result, we have seen a reduced number of market makers. If these market makers exit the industry, fewer real prices would be observed.

A study carried out by IHS Markit proved that the final rules had a significant effect on the modellability of single-name CDSs and cash bonds. For credit default swaps (CDSs), modellability had increased to 26 percent from 18 percent on a population of over 3,000 CDS issuer buckets⁴. Despite the increase, the overall percentage is still relatively low, and as time goes by, banks will be expected to reconsider their holdings in non-modellable products due to the associated capital implications of keeping them on their books.

Many firms and vendors have undertaken studies to measure the availability of historical market data, the example is shown below in Figure 4, to understand how much depth there is in the price verification tests required for modellability. The findings highlight the disparate data points within the industry. This puts pressure on firms to ensure that data storage solutions and corresponding data models are robust enough to pool and integrate data from multiple sources (including capabilities for temporal storage). Firms must rigorously capture all internally generated data points from trading activity and strategically supplement this with data sourced from vendors.

	Inflation	S&P 500	US Junk Bonds	Emerging Market Bonds	International Bonds	Corporate Bonds	US Bonds	TIPS	Intermediate Municipal	Long Term Treasuries	Intermediate Treasuries	Short Term Treasuries	Treasury Bills
Inflation	1.00	0.07	-0.07	0.04	0.07	-0.19	0.05	0.23	-0.37	-0.24	-0.13	0.17	0.70
S&P 500	0.07	1.00	0.64	0.30	0.25	0.38	0.23	0.01	0.23	0.00	0.04	0.11	0.13
US Junk Bonds	-0.07	0.64	1.00	0.46	0.44	0.75	0.48	0.21	0.57	0.18	0.27	0.29	0.03
Emerging Market Bonds	0.04	0.30	0.46	1.00	0.47	0.40	0.33	0.25	0.34	0.20	0.24	0.25	0.12
International Bonds	0.07	0.25	0.44	0.47	1.00	0.69	0.80	0.07	0.62	0.64	0.73	0.77	0.46
Corporate Bonds	-0.19	0.38	0.75	0.40	0.69	1.00	0.85	0.06	0.89	0.65	0.77	0.70	0.16
US Bonds	0.05	0.23	0.48	0.33	0.80	0.85	1.00	0.11	0.76	0.80	0.92	0.92	0.48
TIPS	0.23	0.01	0.21	0.25	0.07	0.06	0.11	1.00	0.02	0.01	0.00	0.06	0.20
Intermediate Municipal	-0.37	0.23	0.57	0.34	0.62	0.89	0.76	0.02	1.00	0.74	0.80	0.65	0.03
Long Term Treasuries	-0.24	0.00	0.18	0.20	0.64	0.65	0.80	0.01	0.74	1.00	0.90	0.67	0.10
Intermediate Treasuries	-0.13	0.04	0.27	0.24	0.73	0.77	0.92	0.00	0.80	0.90	1.00	0.89	0.30
Short Term Treasuries	0.17	0.11	0.29	0.25	0.77	0.70	0.92	0.06	0.65	0.67	0.89	1.00	0.66
Treasury Bills	0.70	0.13	0.03	0.12	0.46	0.16	0.48	0.20	0.03	0.10	0.30	0.66	1.00

Figure 4: Example Table Measuring the Depth of Historical Pricing Assessment

Source: Historical data points from pooled vendors.

NEXT-GENERATION RISK FRAMEWORK DATA: IDENTIFICATION

Regulatory expectations and capital impacts result in a difficult balance between the costs and efforts involved with implementing and managing FRTB. Uncertainty remains to exist around determining the exact capital impacts by NMRFs, alongside ambiguities on the regulatory interpretation and introduction of capital floors subject to the standardized approach. Firms need to be able to measure and assess their trading book liquidity

to be well placed with management information for decision making. Trading strategies and product coverage impacts are key to efficient implementation and capital cost containment. Undertaking an exercise to map and agree the product liquidity rankings can be an effective step towards identification and prioritization of market data gaps.

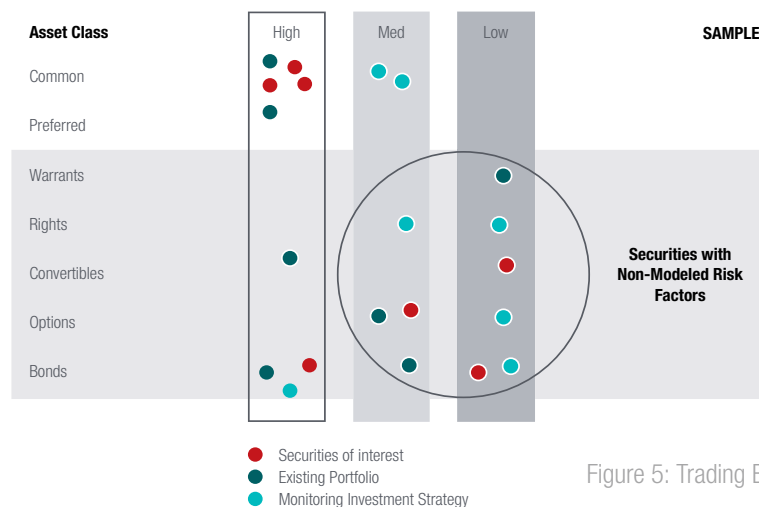


Figure 5: Trading Book Liquidity Ranking Exercise

Asset classes and product types that are particularly challenging regarding market data availability and risk factor modellability include:

- **Fixed income** is one of the most challenging asset classes in the world to model for IMA obligations. Fixed income is challenging partly due to having each bond price mapped to significant risk factors (e.g., FX, risk-free curves) which may require additional inputs. Modellability for fixed income and credit trading may have been affected by a reduction in availability and liquidity from CDSs since 2008. The use of different systems and methodologies between the front office and middle office have caused result variations.
- **Non-vanilla instruments:** Businesses involved in non-vanilla instrument and structured product transactions attract significantly higher regulatory capital requirements than their counterparts. Since these products are typically lengthy and are pay-off dependent, traditional closed-form formulas cannot be used to price these instruments. There are significant challenges to measuring portfolio-level risks with an established high degree of accuracy. The pricing of these issuances requires complex methods (i.e., Monte Carlo simulations) to evaluate the pricing from vendors.
- **Structured products:** Nested simulations are traditionally applied to these types of products but are still considered to be computationally complex to achieve. Profit and loss attribution (PLA) testing is one of the leading model acceptance criteria that aligns the risk pricing with front office pricing. To minimize the risk of failing the PLA test and falling back to the SA, a full evaluation approach in the IMA ES model is recommended.

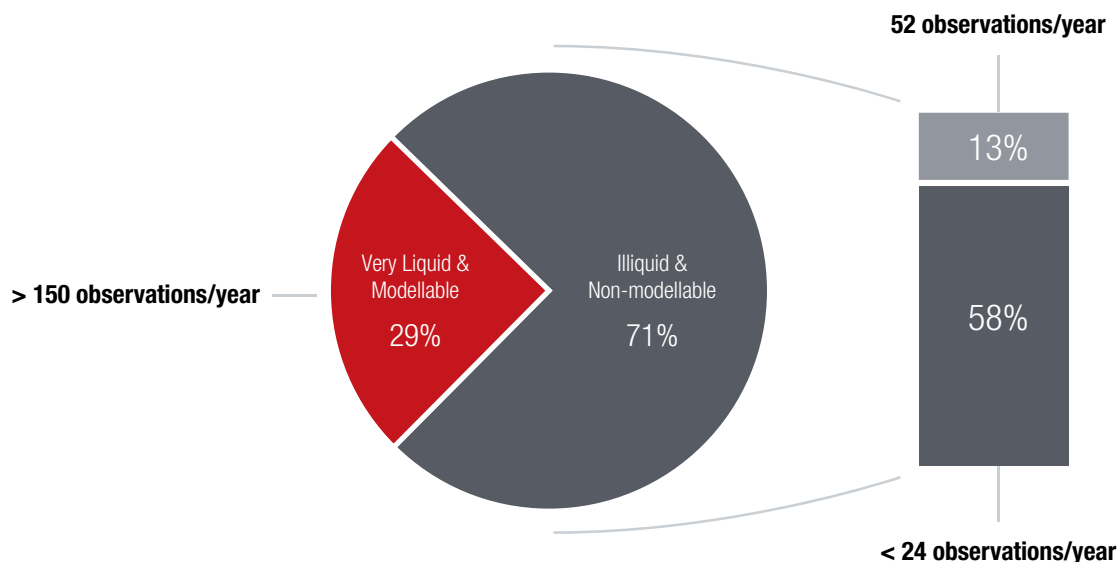


Figure 6: Risk Factor Modelling

Other considerations for complexity include:

- Timing:** Many risk factors are anticipated to be non-modellable due to their eligibility being affected by the timing of their trading activity. In the case of liquid products, they would fail the one-month requirement due to trades occurring at the beginning and end of every month. The ISDA, GFMA, and IIF conducted an analysis using approximately 20,000 risk factors that have a minimum of one price observation per period. They discovered that 71 percent of them are non-modellable⁵ plus this is a constantly changing data set – the ability to have awareness of a modellable risk factor approaching non-modellability allows for more effective risk management.
- Jurisdiction:** The interpretation of FRTB requirements across jurisdictions adds another layer of complexity to uncertainty on best practices to desk level implementation. This dilemma seeks the question: does the strengthening of regulatory oversight, like the Trade Reporting and Compliance Engine (TRACE), enhance how regulators are influencing choices through their frameworks in a way that introduces potential conflicts of interest? An example of this is how Mexican regulators stipulate that each member firm must use specific data sources⁶. One cited measure of this is focused on technological and infrastructure requirements for banks, implementation of a system-wide transaction registry, and an information-sharing initiative. Another example is the large representation of structured products in Switzerland. The yield enhancement products that come along with portfolios of structured products, such as barrier reverse convertibles are prevalent and pose non-modellable FRTB characteristics. And in Canada, the local fixed income market structure presents its' own specific liquidity challenges. Handling these jurisdictional aspects increases the complexity of managing a global trading book and ultimately the cost of execution if it results in punitive capital charges.
- Additional elements:** Seasonality, new issuances, and associations to exotic instruments also contribute towards the inability of banks to obtain 'real' prices using their transaction data. Even applying the ISDA classification structure is a key foundational step that can take significant effort. When adopting IMA, there is immense value in measuring capital charges by favorable risk weightings. If left unattended, the consequence is cliff effects between the SA and IMA – mainly due to banks losing approvals due to insufficient data and robust testing.

NEXT-GENERATION RISK FRAMEWORK DATA: EVALUATION

Having a robust framework for data evaluation and prioritization is essential for considering numerous impacting factors and allocating the resources of the project team and business. Our experience has led us to develop a set of standard evaluation criteria to customize the business priorities for each firm. Each identified gap, challenge, or opportunity can be measured

consistently to allow the focus to be on gaps which are most likely to be resolved and deliver business benefits.

The criteria can be reviewed within the firm to establish specific ratings, key success criteria, and influence the scoring mechanism to suit the overarching business strategic principals.

Factors		High	Medium	Low
1	Trading volume	Significant & regular volume	Variable volume, cyclical	Occasional flow, special request
2	Revenue base	Core Revenue flow and goal for desk	Regular flow but not a core goal	Not core revenue/business goal
3	Number of impacted trading desks	Multiple desks or large desk impacted	Non-large desk or multiple low impacts	Single desk, specialist product
4	SA/IMA expectations	Desks aiming for IMA coverage	Flow could be moved to SA desk	Planned for SA desk only
5	Number of clients impacted	Multiple, broad usage by client base	Key clients trading product base	Specialist or small volume of clients
6	Product complexity	Regular liquid product	Long tenure or illiquid product	Structured or non-vanilla product
7	Data available internally/externally	Available with high quality externally	Available with patchy data only	Requires internal data to augment
8	Granularity availability	Existing data has appropriate buckets	Some require data extrapolation	Granularity consistently lacking
9	Data quality and consistency	Data has a historical and consistent quality	Data is patchy and can be inconsistent	Data lacks history and is low quality
10	External data vendor on-boarded	Additional data from existing source	Provider onboarded for another topic	New provider requiring setup
11	Identified risks/issues	No identified issues or risks	Known challenges with product	Existing MRAs/self-identified risks
12	Percent manual processing	Fully STP, no manual work required	Occasional manual mapping/processing	Regularly requires manual processing
13	Likelihood of modellability	Risk factor data is readily available	Risk factor data is patchy/inconsistent	Risk factor data is lacking/low quality
14	Strategic business choice	Key strategic product – a must	Legacy product – to be reconsidered	Grandfathered, not core business need
15	Regulatory constraints	Standard regulatory requirements – no special treatments	Some regulatory specific constraints to consider	Specific regulatory constraints which require special treatment
16	Geographical complexity	No additional geographical complexity	Minor geographical impacts to consider	Significant or complex geographical considerations

Figure 7: Data Evaluation Matrix

Operational effectiveness

An important aspect of FRTB specific data that firms often overlook is an adaptable, dynamic, and robust data practice with an established collaboration between the FO, market risk and middle office. FO generates and owns the raw and derived data, whereby Market Risk continues to build upon this data set with risk factor time series data with specific requirements for data granularity. Therefore, for data to be available at the quality ready to be utilized, a firm should develop a holistic approach across the firm's operating activities. Centralizing the data can support issue mitigation of operational end-to-end data quality, by ensuring a fully vetted capital data lineage classification approach before metrics are derived. Data quality requirements are driven initially by the real-time accessibility for pricing in the FO, which can then be scrubbed further for downstream Market Risk usage, including product classification and proxying methodologies. Metrics and computations vary across asset classes, and any errors in these classifications can, in turn, increase stress and force an inaccurate capital adequacy ratio.

Furthermore, an FRTB data solution can alleviate manual errors and help to address costly errors from an operational perspective. Often the efforts are constrained by silo's, and challenges exist from:

- Inadequate resourcing
- Poorly defined data quality rules
- Lack of clear ownership for data sets
- Duplicate vendor feeds
- Legacy/redundant processes
- Inadequate data architecture solutions across systems/functions
- Lack of uniformity in terminology and rules engines (used to quantify, measure and analyze risk, etc.)

Reference Data

Given the complex modelling involved with FRTB data, specific metrics are difficult to accurately quantify on an ongoing basis and rely upon access to a consistent and accurate set of reference data.

Through our experience working with large institutions, firms often perceived these gaps as quick fixes to the existing data practice, usually asset class-based silos. However, they can lead to significant failures in the execution of the risk and pricing models, or worse - inaccurate model outputs. Simple data gaps like a misrepresentation of a security (e.g., bonds with a call/put optionality) could result in misidentification of the bond as being option-free. This results in the underestimation of market risk with lower VaR figures.

Gaps in a security's attributes data, for example:

- Inaccurate coupon frequency in a bond
- Out of sync dividend dates inequities
- Missing reference rates for swaps
- The incorrect expiration date of a futures contract

Regardless if there is access to a valid data feed, these gaps will still result in the risk model being unable to price the security accurately and ultimately may lead to incorrect capital calculations.

Although ad-hoc data fixes can alleviate these data pain-points, a centralized data source approach will act as a strategic solution. 'Golden source' data practices can provide the opportunity for users to tackle these data gaps systematically. For example, developing automated processes with enhanced manual checkpoints can establish a framework of consistent data quality controls. While the cost of maintaining this data can increase, alternative solutions such as offshoring data cleansing procedures can be considered.

NEXT-GENERATION RISK FRAMEWORK DATA: OPTIMIZATION

While many gaps may have been identified, the business prioritization of which ones to solve first is predominantly focused upon three objectives:

1. What is the capital cost impact on the lack of comprehensive data?
2. Is this revenue/product flow representative of a strategic business objective?
3. What will it take to achieve IMA approval is it worth it?

We believe that firms can better optimize their data by leveraging our defined matrix for data gap evaluations (Figure 7), to understand priorities across a range of capital advantages. Given the evaluated availability of data – both internally and externally – a firm can prioritize on data needs for resolving the most important and achievable revenue or product flow.

What is the capital cost resulting from a lack of data?

The IMA is the best-case scenario to achieve lower capital charges. To illustrate the benefit on the IMA versus SA, the industry conducted an impact study using a sample of 33 banks with quality data. The findings demonstrated FRTB capital for trading desks under IMA is 3.21 times larger than the capital based on current IMA rules⁷. To have trading desks govern the process, they are first required to be: (1) nominated by the bank and, (2) satisfy back-testing, PLA tests, and capitalization levels. A rigorous process of stress testing is essential to standardize ES by applying a dataset with a sample size of 10 years history (at minimum). Depending on the class of risk factor, market liquidity is integrated into the application by certifying a liquidity horizon range between 10-250 days. Under this approach, although preferably ideal, securing market data on assets with varying liquidities is a challenge to ensuring regulatory model approvals.

SA is the easier fall-back method for determining capital charges if the bank fails on implementing an internal model.

The SA capital requirement stems from the summation of three components; (1) risk charges under the sensitivities-based method, (2) the default risk charge, and (3) the residual risk add-on. Under this method, the financial institution must provide a regular disclosure report, for all trading desks.

The FRTB requires banks to source reliable data to comply with standards. For banks that wish to use IMA, they must pass the RFET test, which places a strain to source, organize, and map data for the risk factors. A June 2017 report by the ISDA, GFMA, and IIF highlighted that 36 percent of the IMA capital charge will be attributed to NMRFs⁸. When adopting IMA, there is immense value in measuring capital charges by favorable risk weightings. If left unattended, the potential consequences include so-called cliff effects between SA and IMA - mainly due to banks losing approvals due to insufficient market data.

NMRFs could result in over-capitalization, poor capital alignment with the underlying risks, and may undermine the viability of IMA. Classified as a capital add-on under the ES model, the BCBS addresses the dilemma of risk modelling for instruments lacking sufficient price observations. For a risk factor to be considered as 'modellable,' the BCBS states that there must be 'continuously' available 'real' prices for a representative set of transactions. The criteria to establish whether a price is 'real' include a price that is (1) an institutional conducted transaction or (2) a transaction between other arms-length parties or (3) obtained from a committed quote.

Morgan Stanley looked at a representative sample of U.S corporate bonds and discovered in their findings that only 43 percent of the assets meet the one-month gap rule⁹. By

extending the allowable time-gap between months to 90 days, they found that 60 percent of the same representative sample would satisfy a 3-in-90-day test. Implying that trading activities of liquid products could follow cyclical patterns - resulting in failing the one-month gap rule.

The failure of the one-month gap rule compromises the firm's ability to obtain IMA approvals and subject the firm to take the standardized approach and their impact on capital relief and in turn, their trading strategies. Consequently, potentially harmful impacts could result in an emergence of rising trading costs when executing transactions, longer durations for counterparties pairing, and ultimately, a reduction in overall market liquidity. Understanding NMRFs is still a process that is evolving as developments between the regulator and the industry continue to grow. The anticipation is that a large number of risk factors are to be non-modellable. The ISDA and the Association for Financial Markets in Europe (AFME) identified the most relevant and common risk factors as:

- Non-G10 rates
- G10 FX volatilities > 3 Years
- Non-G10 FX volatilities
- Interest rate (IR) volatilities other than EUR and USD
- IR out-of-the-money (OTM) volatility for all currencies

- Most non-US credit risk factors
- Single name equity risk factors other than a spot for developing markets (i.e., implied volatility, repo, rates, and dividends)

Data pooling and proxying

Contiguously, there is an increased need for storing history of market data, with the observation horizon for determining the most stressful 12 months spanning back to (and including) 2007 at a minimum. This means banks require reliable and flexible storage for time series data, with the ability to consolidate data sources to fill data gaps. The need for good quality data to evaluate, monitor, and manage is critical; including the ongoing data quality processes for eliminating inconsistencies among information sources and preventing inaccurate data from pre-existing. Carefully managing the accurate outcome of capital calculations will significantly impact a firms' investment decision strategy with the potential for creating a meaningful governance framework for the future. Depending upon the business need, the sourcing of good quality market data from a diverse set of sources may be the key to success; including the capability to consolidate across internal and external sources.

Ultimately, market risk is the consumers and must define a consolidated data set of risk metrics to analyze gaps, understand systemic issues, and map data behaviors. The challenge is sourcing compatible and accurate market data and integrating the enormous volume of data to meet the FRTB needs.

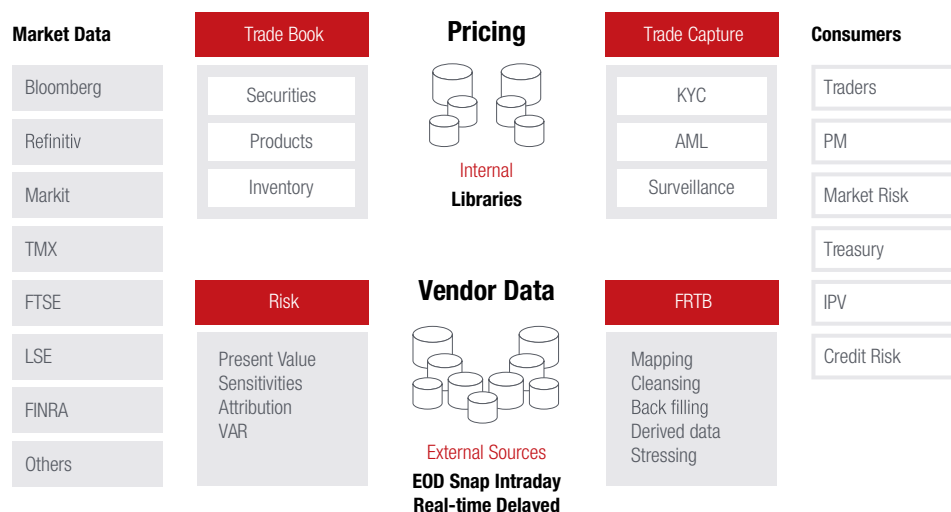


Figure 8: Data Sourcing & Integration Architecture

The challenge for all banks is that in some asset classes or products, such as those with long maturities or less liquid underlyings, their trading volume is not high enough to meet the modellability criteria. The usual data vendors, exchanges, and trade repositories often do not have these complex products in their data sets or post-trade information required to meet regulatory approval. Recent research shows that a mix of pooling and proxying will deliver the best capital impact on banks¹⁰. However, only 34 percent of respondents globally have a 'pretty good idea' of their proxying strategy, and 38 percent of respondents have not started thinking about it yet, the survey said. A significant proportion of the market, therefore, risks falling behind the first movers who are well advanced with their proxying strategies.

Vendors are developing tooling in this space – collating and cleansing the data, removing duplicates and aggregating

transaction history in the same instrument into one complete time series. Such a series can give a more accurate indication of an instrument's liquidity than an individual bank's data in isolation. And such an NMRF utility, if set up well, can ensure that contributing banks can maintain ownership and control of their data and have their data in a secure place but can still get the benefit of a shared portfolio view.

The future market-data environment will see contributions from several large vendors, trade repositories, and industry utilities. The concept of pooling multiple banks data to achieve a sufficient number and frequency of transactions are often grassroots industry initiatives beginning to take shape. Yet, the success of these initiatives is dependent on the contributing banks IP ownership, including the control and security of their critical transaction data.

NEXT-GENERATION RISK FRAMEWORK DATA: SOURCING

To design and implement a robust market data solution, firms should conduct a current-state assessment of market data capabilities and infrastructure. This requires a thorough understanding of key requirements, technology architecture and operational effectiveness. From a current state perspective, firms must consider whether internally stored data satisfies the RFET, as well as stressed expected shortfall requirements.

To address the prioritized requirements, each asset class (e.g., credit) needs to be assessed in its component products (e.g., corporate bonds) and then sub-products (e.g., high yield versus investment grade), which are mapped to risk factors. Additionally, a risk factor can be broken down into a more granular level of risk drivers (points on a curve/surface). These buckets provide a mapping schema for RFET observations to be used as criteria in the sourcing decision.

Enhancing data internally

Improving a firm's FRTB pricing observations strategy is a key concern for firms implementing the new regulation.

The key drivers for data-related change in the RFET are twofold. Firstly, the new requirements have a stricter criterion for what constitutes a real price - banks can no longer rely on price observations such as trader marks. Secondly, FRTB prescribes a strict bucketing criterion for price observations so firms must

Banks can choose to address data gaps wholesale by designating a centralized source that accommodates FRTB alongside other market and credit risk data requirements. Ultimately, a firm can benefit significantly by investing in a centralized market data source that aggregates data from internal systems of record alongside external vendor data. Benefits of this approach include centralized governance and oversight structures to promote data quality and efficient delivery to multiple systems, models, and users. Firms have also benefited from developing specialized 'risk security masters' that serve as golden sources of data with 24/7 data availability, enhanced data sets, and calculations.

ensure that they have the appropriate depth and granularity of data for relevant price observations. Banks can review coverage with a risk factor catalog that has all risk factors from pricing models mapped to products and real prices. Firms are likely to find that their quarterly VaR completeness exercise can be a good starting point to achieve the risk factor catalog.

Accessing data externally

To establish a vendor as an ongoing data provider which meets the data requirements for FRTB, we recommend a formal RFI/RFP approach where the companies are compared for service, data quality, and pricing.

For firms that are considering collaboration with a vendor or multiple vendors to address gaps, there are several factors to consider:

- **Availability:** Firms must assess whether the vendor can supply the required data. For this exercise, it may be helpful to utilize the product to sub-product to risk factor mapping prepared as part of the current state assessment.
- **Existing vs. new package:** The required data may be a net new buy or a feed that the firm gets currently through an existing package, but it is not fully utilizing.
- **Technology:** If vendors can provide data through existing technology connections or data feeds, it may be possible to avoid or reduce costs associated with technology builds.
- **Cost:** For smaller firms, it may be more cost-effective to commission a team to create internal market data rather than buying the data continuously from a vendor.
- **Best of breed vs. single source:** Firms may consider one or multiple vendors for an analytics platform that supports FRTB components such as PLA or modellability and choose to supplement that platform with niche data from other specialized vendors.

Firms can also expect improvements in overall efficiency due to technology upgrades and cost savings resulting from redundancy reductions. Tracking these benefits over time can help justify spend and create a strong case for a firm to invest in a robust market data solution.

Understanding both the one-time and ongoing costs associated with building out the market data function for FRTB is essential for an effective business decision. One-time costs include documenting requirements and scope, customizing the platform, establishing vendor data feeds and STP for business processes as well as one-time purchases of historical data to backfill

missing time series. Ongoing costs include data purchases to satisfy change requests, subscription costs (monthly) to data storage and ongoing data governance/quality control functions.

As a high-level control framework, we reference a methodical approach for selecting vendors through an RFI / RFP process – as below. However, our previous engagements have taught us that the selection of risk market data solutions often requires additional, customized and expert-driven assessments to get into the detail and solve specific scenarios.



Figure 9: Vendor RFI / RFP Process

If we consider the problems holistically, as a comprehensive data operating vision, the needs for the data span from risk mitigation through to cost control, increased governance, and ongoing accuracy with suitable availability, these multi-directional

business cases require a careful and detail-oriented approach – for which we have developed a range of accelerators to support evaluation of the individual issues.

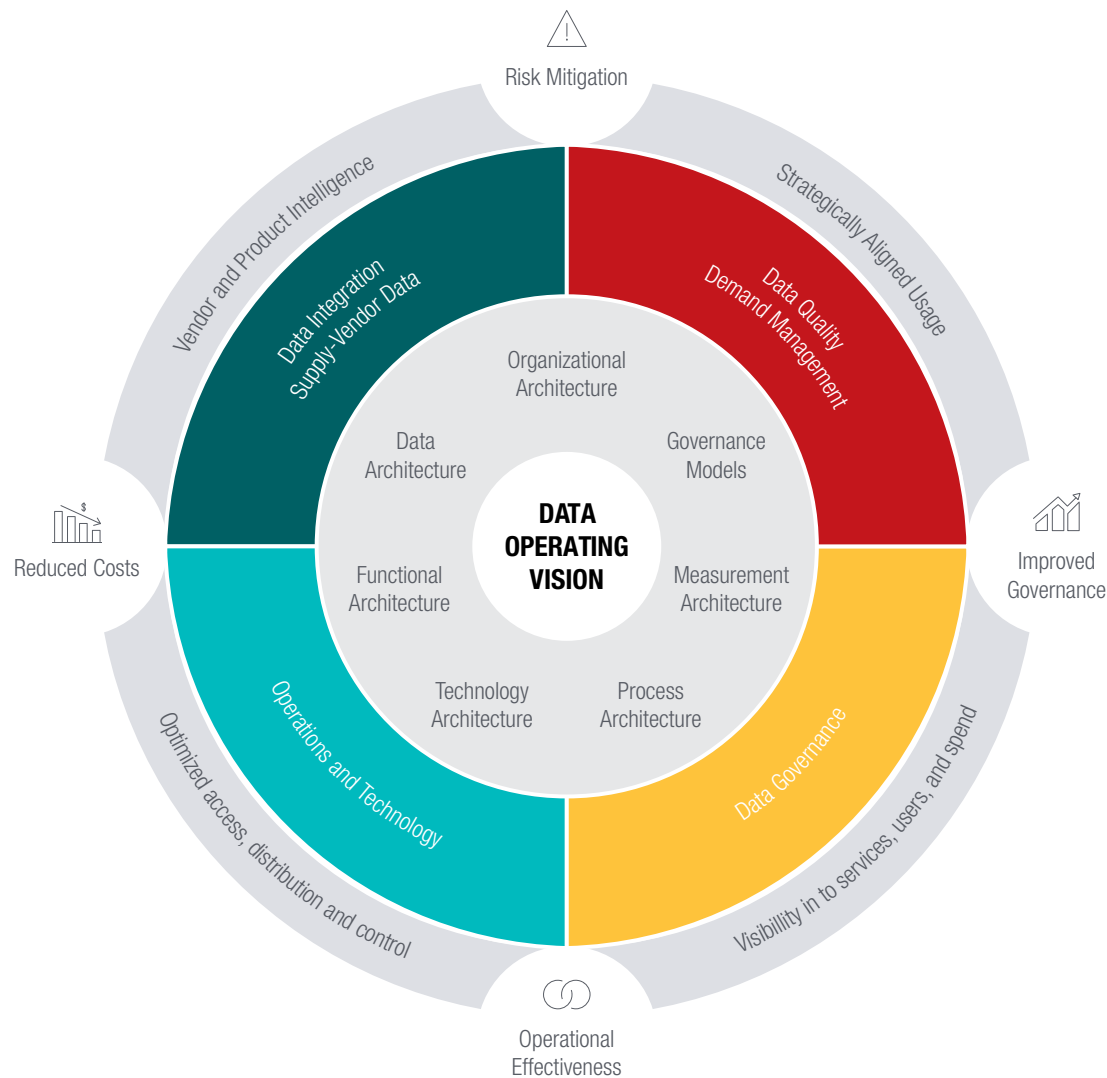


Figure 10: Data Operating Vision

To make a vision become a reality, practical advice and support are required to enable change. When clients are selecting services to support the implementation of enhanced market data, there is a wide range of offerings.

Project Governance & Resourcing	Business Requirements & Future State Definition	Industry & Data Sourcing Expertise	Technology & Data Architecture
<ul style="list-style-type: none"> • Clear and scalable program governance structure • Resourcing support for the reporting teams and market risk capital calculations • Multi use-case approach for efficiency, e.g., BCBS239 teams to leverage existing knowledge and resources • Assessment of business unit engagement, communication, and adoption of change • Quality acceptance and sign-off for applications and user experience – conversion, testing, and data quality • Assessment of business processes and operating model to support the consolidated platform 	<ul style="list-style-type: none"> • Business requirements definition including data, analytics, and reporting, as well as ‘playbooks’ for agile implementations • Alignment of FO to Risk to Finance data (trade data, reference data, market data, and risk data), process and operating models • Capability for desk level reporting and model validations • Approaches for minimizing NMRF • Auto Scenario Generation • Target end-state definition – to meet the needs of the business before & during the consolidation 	<ul style="list-style-type: none"> • Assessing and qualifying a firm’s securities of interest against capital impact • Sourcing expertise on Market Data products and services including where to find or build high-quality data sets for use in IMA • Market structure expertise across global markets specific to structured securities with NMRF characteristic. • Calibration of datasets through techniques such as evaluated vendor services to strengthen the IMA approval process • Cross product gap analysis with product prioritization, vendor sourcing, and internal coverage maps 	<ul style="list-style-type: none"> • The current state of architecture review and future state options, as well as gap analysis results • Technology solution designs, including architecture, infrastructure and vendor selections • Governance & data quality stewardship – current & future ‘consolidated’ state • Technology assessment – development and ongoing maintenance for the platform consolidation • End to end data lineage analysis with upstream, downstream and golden source assessment • Management and governance for design authority for strategic modular enhancement

Figure 11: Business Accelerators & Service Offerings

NEXT-GENERATION RISK FRAMEWORK DATA: CONCLUSION

Taking a wholesale approach to market data, including investment in optimized sources across internally and externally available data, can benefit a firm beyond FRTB. Benefits include independent price verification, internal models under the SA-CCR regime, CCAR, risk, FO valuation and intraday risk management. If firms focus solely on FRTB in a silo, redundancies are likely and certain requirements may fall through the cracks. This can result in firms buying the same data twice and potentially missing out on opportunities for capital relief. For many banks, FRTB acts as an incentive to exit unprofitable businesses and offers firms the ability to adjust their trading strategies accurately, dependent on the availability of relevant data.

Given the challenges faced by many firms on a global basis, the vendor environment has been exploring new tooling and approaches to optimize the sourcing of data and computational platforms to develop enhanced risk management capabilities. Capco and the Market Data Company believe that this is the right time to develop longer-term strategies and consider alternative approaches, as the next generation of risk frameworks provide firms with information to manage their trading strategies, pricing and risk management with greater accuracy.

REFERENCES

1. BCBS Consultation Paper – Revisions to the Minimum Capital Requirements for Market Risk. ISDA, GFMA, and IIF to BCBS. June 2018.
2. Market value based upon published company annual reports.
3. JPMorgan Chase & CO. Average Annual Market Risk VaR is calculated by averaging 2018 1Q-4Q results. VaR is taken at the 95% confidence level, contrary to the 99% confidence level for the other banks. For Royal Bank of Canada VaR values are converted to USD. CAD/USD Exchange rates are those for October 31 of the respective year. Exchange rates for 2018, 2017, 2016, 2015, 2014, 2013 are as follows: 1.3155, 1.2886, 1.341, 1.3078, 1.126, 1.0431, respectively.
4. IHS Markit; Final FRTB text: Is the light finally green for modellability? February 2019.
5. BCBS Consultation Paper – Revisions to the Minimum Capital Requirements for Market Risk. ISDA, GFMA, and IIF to BCBS. June 2018.
6. Financial Stability Board – FSB Correspondent Banking Data Report. 4 July 2017.
7. BCBS Consultation Paper – Revisions to the Minimum Capital Requirements for Market Risk. ISDA, GFMA, and IIF to BCBS. June 2018.
8. FRTB QIS 7 Refresh – Spotlight (June 2017). ISDA, GFMA and IIF. June 2017.
9. Revisions to the Minimum Capital Requirements for Market Risk”. Morgan Stanley to BCBS. June 20, 2018.
10. Fewer Than Half of Banks Ready to Deal with Impact of FRTB by 2022. IHS Markit Survey. News Releases. HIS Markit. September 17, 2018.

AUTHORS

Natasha Leigh Giles, Capco, Managing Principal

Robert Benedetto, Market Data Company, Partner

Edmond Farah, Market Data Company, Senior Consultant

CONTRIBUTORS

Brad Zavertnik, Capco, Principal Consultant

Korey Reynolds, Capco, Principal Consultant

Shashank Musale, Capco, Principal Consultant

Carey Westgate, Capco, Senior Consultant

John (Jack) Power, Capco, Senior Consultant

George Phillips, Capco, Senior Consultant

ABOUT CAPCO

Capco is a global technology and management consultancy dedicated to the financial services industry. Our professionals combine innovative thinking with unrivalled industry knowledge to offer our clients consulting expertise, complex technology and package integration, transformation delivery, and managed services, to move their organizations forward.

Through our collaborative and efficient approach, we help our clients successfully innovate, increase revenue, manage risk and regulatory change, reduce costs, and enhance controls. We specialize primarily in banking, capital markets, wealth and asset management and insurance. We also have an energy consulting practice in the US. We serve our clients from offices in leading financial centers across the Americas, Europe, and Asia Pacific.

To learn more, visit our web site at www.capco.com, or follow us on [Twitter](#), [Facebook](#), [YouTube](#), [LinkedIn](#) and [Instagram](#).

ABOUT MARKET DATA COMPANY

Market Data Company (MDC) is a leader in market data contract compliance, operations, technology, and advisory services. MDC has extensive experience guiding organizations navigate through optimization programs and associated organizational transformations. We have supported a significant number of buy- and sell-side firms through the development of models and implementation of road maps. Our unique range of experience and skills has positioned us to effectively diagnose, design, and implement change successfully. MDCs framework helps investment firms ensure that commitments to compliance and data optimization are clearly articulated and aligned to other strategic objectives.

WORLDWIDE OFFICES

APAC

Bangalore
Bangkok
Hong Kong
Kuala Lumpur
Pune
Singapore

EUROPE

Bratislava
Brussels
Dusseldorf
Edinburgh
Frankfurt
Geneva
London
Paris
Vienna
Warsaw
Zurich

NORTH AMERICA

Charlotte
Chicago
Dallas
Houston
New York
Orlando
Toronto
Tysons Corner
Washington, DC

SOUTH AMERICA

São Paulo

WWW.CAPCO.COM



CAPCO
THE FUTURE. NOW.