quantifi

Newsletter | Spring 2023

IN SIGHT

IN THIS ISSUE:

New technologies *shaping* risk management

CEO Message

I wanted to share a poem ChatGPT wrote about Quantifi...

Dear clients, let me introduce,
A company that's cutting-edge and true.
Quantifi's our name, and our aim's to assist.
Investment managers, banks, and corps, we enlist.

Our analytics and risk numbers are the best,
More accurate than all the rest.
Our ears are always open to your needs,
So we can deliver solutions that exceed.

Not the best poem but nevertheless an impressive example of the tremendous potential for technology to transform business. As a fintech company, Quantifi is in the center of both market and technology change. We see the impact these changes have on clients and the benefits that can be achieved with the right solutions in place. For our clients, the right solution is not just technology, but technology adapted to fit their business needs combined with a strong partnership to manage ongoing change.

Two significant areas of technology transformation are Data Science and Machine Learning. In this issue, our cover story highlights how companies are investing more in technology, particularly in areas like data science, to transform, scale and optimise their businesses. A second article explores the evolution of model risk management, partly influenced by the advancements in machine learning.

This has been a busy quarter for Quantifi with a number of successful implementations, new client wins, and awards. I'm proud to announce some recognition from Risk.net as 'Pricing and Analytics Product of the Year' and Asia Risk as 'Best AI/ML Innovation' and 'Best System Support and Implementation'. I'm particularly proud of the last award as testament to our client focus and our commitment to deliver exceptional support and smooth, speedy implementations.

Today's volatile market landscape, driven by the Ukraine invasion and US banking crisis, underscores the importance of risk management and the role of technology. With this in mind, I hope you find this newsletter both topical and useful.

Best regards,

Rohan Douglas, CEO, Quantifi

Contents

FEATURE

Leveraging Data Science for Next Generation Risk & PnL

How has data science transformed finance?

Firms are deploying data science tools to improve risk assessment and business response strategies and bring more rigour to their operations. Having on-demand access to significant computational resources via the cloud, with high-performance data stores and in-memory architectures, enables firms to do more ad-hoc analysis, testing and validation. This is done using the most granular levels of data and without the need to pre-aggregate or pre-format the data. Firms, however, do face the challenge of how to enable their quants and data scientists to produce high value work without compromising the security and restrictions on who can access and adjust official risk and PnL numbers.

Historically, risk managers have had to 'lock down' the official platforms. This created two main problems that hampered advanced analysis.

The first is duplication of work: to carry out sophisticated analysis using the firm's actual trade and/or market data, quants sometimes needed to re-develop the pricing models implemented as part of the firm's 'official' PnL platforms. This is time-consuming and complex, especially for derivative products or when an accurate representation of all trade details is required.

The second is inconsistency: inevitably, the models implemented independently by quants/strats/data scientists differ from the official ones and divergence typically grows with the complexity of the products. This is particularly true when a technology provider incorporates pricing models in the PnL platform.

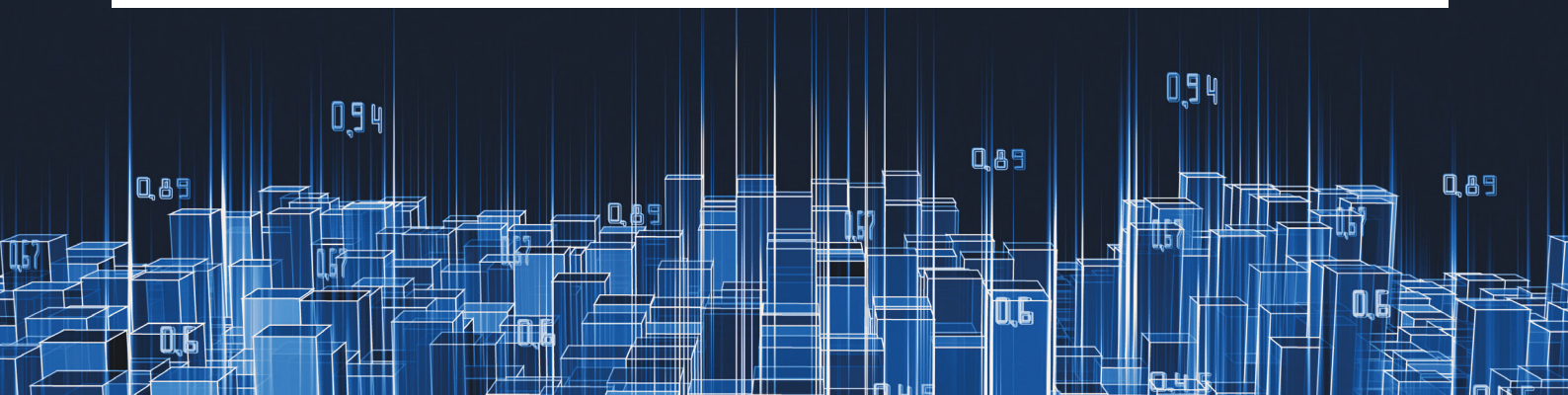
Modern data science tools integrated into the latest generation of Mark to Market (MtM) platforms solve both problems.

Integrating data science tools into existing processes

Open-source data science tools provide many possibilities for building various machine learning (ML) models and analysing vast amounts of data. However, to be helpful in real-world applications, the data underlying any analysis must come from a source system. For modelling even simple products such as bonds, one usually needs relatively complex building blocks like interest rate curves, reference data, exact product definitions and market quotes for interest rates and bonds. Collecting, representing and normalising this data is a complicated and tedious task and inaccuracies in modelling these components can affect or even invalidate any further analysis.

A new set of API tools is now emerging. These tools are designed to seamlessly integrate open-source data science packages and programming environments with more traditional MtM risk platforms, such as Quantifi. These new APIs enable innovative integration between a standalone risk platform and programming environments that quants and traders can easily use on their desktops.

This framework provides the next level of interoperability by allowing the transfer of fully calibrated complex objects (like curves, volatility surfaces, product or trade representations) to various parts of the risk ecosystem. Using these APIs, quants and quant traders can take an existing portfolio of



trades from the risk platform and perform back-testing, custom VaR calculations, ad-hoc scenarios or sensitivity analysis independent of the primary risk platform. Alternatively, users can simply extract the required data objects such as curves, quotes and reference data and construct new trading strategies. They can also apply these objects to price bespoke derivatives not handled by the PnL platform.

Another advantage of this new technology is that it allows users to work in their preferred programming environment, for example, Python in Jupyter Notebooks or other popular programming languages and integrated development environments (IDE). Users can also perform their analyses and/or build advanced models using the APIs on their local machines. At the same time, the primary PnL platform can be operated elsewhere, even hosted in cloud-computing platforms.

Achieving consistency in a low-code setting

Using the framework described above, users can ensure consistency between pricing trades in an 'official' MtM platform and their local development environment. This is because all the business objects required for calculations are passed directly from the platform, where they were created using the pre-defined 'official' set of pricing rules and parameters.

In addition, users benefit from a truly 'low-code' environment, where the risk platform handles the setup of complex trade pricing logic. Users can therefore focus on adding value by implementing high-level tasks such as portfolio back-testing, custom scenario or risk measure calculations or portfolio optimisation. All of this can be achieved without spending time on setting up the underlying risk factors, security or trade details.

Furthermore, this framework can facilitate the transfer of objects representing any trade type supported by the MtM platform, no matter how complex. As a result, users can run analyses on portfolios consisting of mixed trades and hedges, both vanilla and derivatives. By using high-level code, users avoid the extra layers of complexity inherent in low-level code. Moreover, because the process runs standalone from the central MtM platform, users can be confident that they will not negatively affect the performance of the primary platform or the integrity of the data. The framework also allows integration with popular ML libraries, which often require extensive use of computing power, again without affecting the performance of the primary MtM platform. Consistency between the two is also maintained.

The MtM platform also takes care of the data dependencies (i.e. market and reference data) required to price trades. The process involves automating the trade and market data feeds and preserving the relationships and hierarchies of data from multiple sources. Users can therefore focus primarily on implementing new functionalities instead of 'cleaning' the data.

> **Quantifi's data science enabled platform allows quants and traders to automate and 'outsource' the task of manually collecting and processing data.**

Integrated risk platform, powered by data science

Advanced ML models can be set up using accurate trade and product representation and consistent market data and pricing rules. This adds new levels of flexibility and robustness while ensuring consistency throughout the modelling process.

Quantifi's data science enabled platform allows quants and traders to automate and 'outsource' the task of manually collecting and processing data. Users can focus on implementing the required custom business logic, complimentary to the functionality of the platform and significantly reduce delivery times. This new data science platform provides clients with the ability to do complex data analysis and flexible reporting using Python, Jupyter Notebooks and other popular data science tools. Integrated with its advanced model library, clients benefit from complex data-driven analysis, strategy back-testing, ad hoc portfolio what-if scenarios – all using mixed data sets from diverse sources.

COVER STORY

New technologies *shaping* risk management

The financial services industry is going through tremendous change – market dynamics are being shaped by a tough economic environment, a competitive landscape and the acceleration of new technology. In the current climate, firms face multiple risk management and business challenges. To succeed they need to invest in the latest technologies that provide a holistic view of risk, help reduce costs, improve operating efficiency and enable insights to better serve clients.

Over 100 individuals from across the financial services industry were invited to take part in the survey.

What do you think will have the greatest impact on the markets in the next 12 months?

Global geopolitical risks have soared since Russia's invasion of Ukraine and have delivered a sharp shock to business sentiment, which had slowly been recovering as COVID-19 lockdown measures eased. This survey found that inflation (49%) tops the list of developments likely to have the greatest market impact over the next 12 months. Others cited rate rises (19%), the war in Ukraine (16%) and recession (16%).

In an environment where firms are increasingly concerned about return on capital, cost and business flexibility, they need to increase their focus on risk management. A firm's risk technology must be capable of tackling today's complex challenges while remaining flexible and scalable enough to keep up with future market changes.

In which areas are you increasing technology spend to enhance risk management?

The growth of fintech, big data, cloud computing and other related technologies has developed rapidly. According to Gartner, banks and investment firms will spend $623 billion on technology products and services in 2022. As technology innovation accelerates, firms need new ways to better understand, predict and protect against both traditional and emerging risks.

Evolving technology and advanced analytics are enabling new products, services and risk-management techniques to help firms make better trading and risk choices, spot market opportunities and improve their bottom line. The financial services industry generates and uses huge amounts of information. Most firms (34%) are increasing their spend on data science with a view to improving trading strategies, portfolio management, regulatory reporting and client targeting.

Cloud (23%) is another focus of significant risk tech investments. The adoption of cloud has fast-tracked in recent years with firms seeing the benefits in terms of greater business resilience and agility to respond to market demands by implementing new functionality faster. Firms that have traditionally operated in a siloed manner are re-evaluating their solution strategies for pricing and risk management not only from bottom-up / top-down but also from front-to-back perspectives for market data, modelled prices and risk measures. An additional twenty-three percent of respondents are raising spending on integrated risk management solutions.

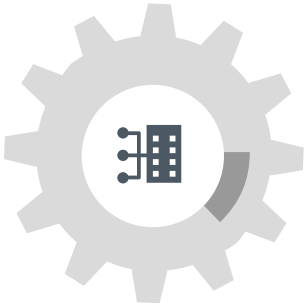
Firms are increasingly turning to trusted fintech providers to drive technology innovation as they have proved to be agile and unconstrained by old technology. These providers offer a low-cost (compared to internal build), low-risk and faster route to innovation.

Which approaches are you using to reduce the cost of operations?

Significant changes are expected in the global financial markets. Several key factors, ranging from technological advancements to geopolitical shifts, are anticipated to shape the industry's direction in the coming year. This new environment has increased the cost agenda to a higher level of importance. Firms now must intensify and accelerate their cost transformation programmes.

Forty percent of firms automate processes to help reduce the cost of operations. Automation of business processes helps firms rapidly scale up, improve process quality and accuracy, reduce cycle times and improve compliance. Over the past couple of years, automation technology has become more embedded within financial services as employees have shifted to remote working. This has resulted in the acceleration of firms' digital transformation, especially regarding cloud, machine learning and data science.

With companies becoming more mindful of the need to replace laborious, manual processes with new technology, they are utilising a variety of innovative technologies to change the way they do business. Techniques such as machine learning and analysing big data have become increasingly commonplace as firms hunt for an edge in trading markets. Of those surveyed, thirty-four percent are using new technology to reduce the cost of operations.



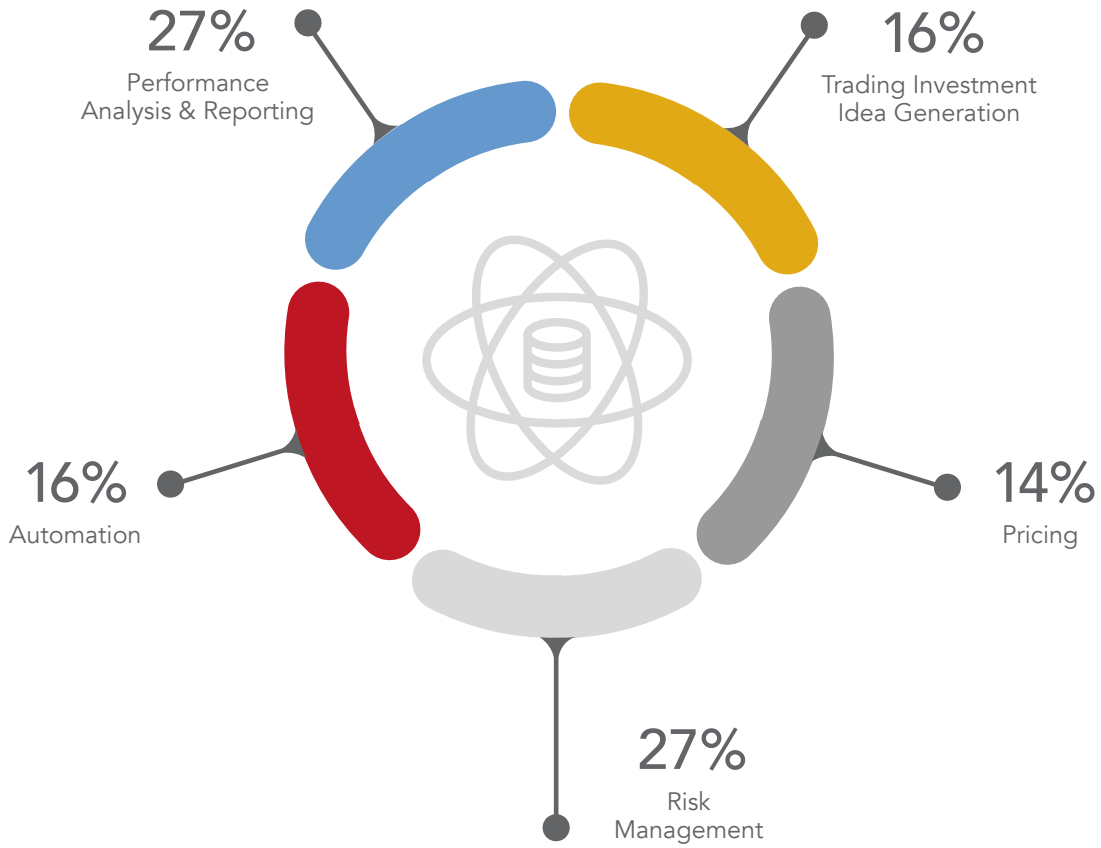
13%
System Consolidation

13%
Outsourcing Risk Analytics

34%
Leveraging New Technologies

40%
Automating Processes

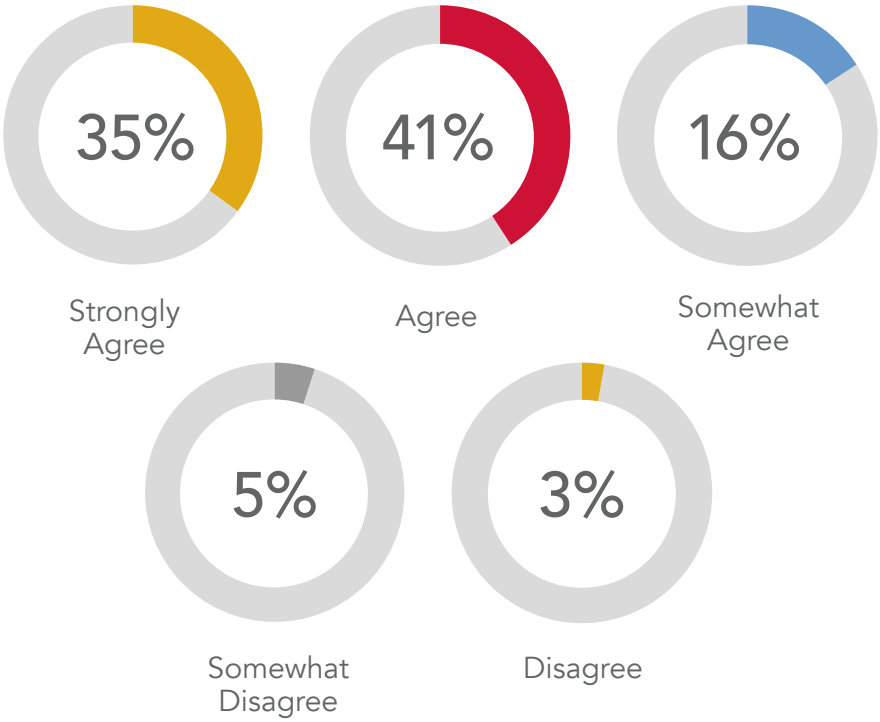
Which do you consider to be the best application of data science?



Over the past few years, data in financial markets has grown at a huge rate and big data technologies have emerged to help firms handle it. One of the key technological transformations designed to deal with big data is data science. The drivers for employing big data technologies include a shift in trading strategies, increasing complexities of processes, transparency and the need to handle and manipulate data at speed.

The evolution of data science and advanced analytics has given rise to a range of applications designed to provide real-time intelligence and allow firms to detect threats such as credit, market and operational risk and take early action.

To what extent do you agree with the following statement: "Data science is a key area of focus for my business"?



Financial services firms have been enthusiastic adopters of data science and have helped push the art and science of the discipline to the leading edge. Seventy-six percent of respondents stated that data science is a key area of focus for their business and only three percent stated it was not.

Buy- and sell-side firms, as well as technology providers like Quantifi, ingest large volumes of data across thousands of data points to build models and report functionality. As a result, there has been an upsurge in data science tools, technologies and processes.

The use of data science is moving from a leading-edge option to a core capability. Over the past year, Quantifi has on-boarded several clients to its data science platform. Data science is gaining traction because it allows firms to focus their resources efficiently, make smarter decisions and improve performance.

FEATURE

Model risk management is evolving: regulation, volatility, machine learning and AI

Emerging from the impact of the COVID-19 pandemic, the world is now dealing with geopolitical uncertainty, increased concerns over counterparty risk and rising interest rates, all of which present fresh challenges for model risk managers. Thomas Oliver, head of model validation at Quantifi, explores how the model risk management (MRM) landscape is changing in response to these challenges.

Which model risks are regulators most concerned about in 2023?

With the high-profile failures of entities such as Archegos, FTX, Silicon Valley Bank and Credit Suisse, many regulators are pressing banks to ensure they have completed adequate assessments of their liquidity, credit and counterparty risks. This includes due diligence against fraud and satisfactory credit risk methodologies for evaluation of entities with concentrated operating exposures, such as crypto assets, sector-specific concentrations or asset-liability mismatches. Longer term concerns raised by the US Federal Reserve and PRA have related to model estimation of climate change risks in long-maturity commitments, such as infrastructural or mortgage lending.

Regulators now expect high visibility on a bank's internal model risk – model inventory, review life-cycle, usage governance – alongside evidence of established control processes. However, regulators have been sympathetic to the additional risk management complexities faced by firms during the pandemic and in the aftermath of the invasion of Ukraine, with many regulators extending timescales for full Basel III compliance – for example, to January 2025 for the UK and EU.

How is machine learning influencing MRM?

Machine learning has scope to transform multiple areas of MRM. As machine learning models enter operational usage, there are additional requirements to evidence model robustness and explain model decision-making. Complex machine learning models may need use of decomposition analysis with techniques such as local interpretable model-agnostic explanations, Shapley additive explanations or implementation of dedicated interpretability models. There may also need to be additional evidence of sufficient operational and implementation steps – firms' machine learning operations – to ensure complicated models have reproducible outcomes, timely recalibration and accurate alignment between methodology and production deployments. More sophisticated models, in areas such as natural language processing, may also have reliance on external models (transfer learning), such as GPT-4, with adaptions for specific tasks rather than training from in-house inception. This means that model management needs to understand the risk of biases or deficiencies even when, in some cases, there may not be visibility on the original training data or calibration code.

Machine learning promises increasing support for validators to systematically benchmark models and performance.

On the validation side, machine learning promises increasing support for validators to systematically benchmark models and performance to minimum expected thresholds, such as using multi-model automated machine learning checks, to ensure proposed models are making use of all potentially relevant data and identifying any possible enhancements.

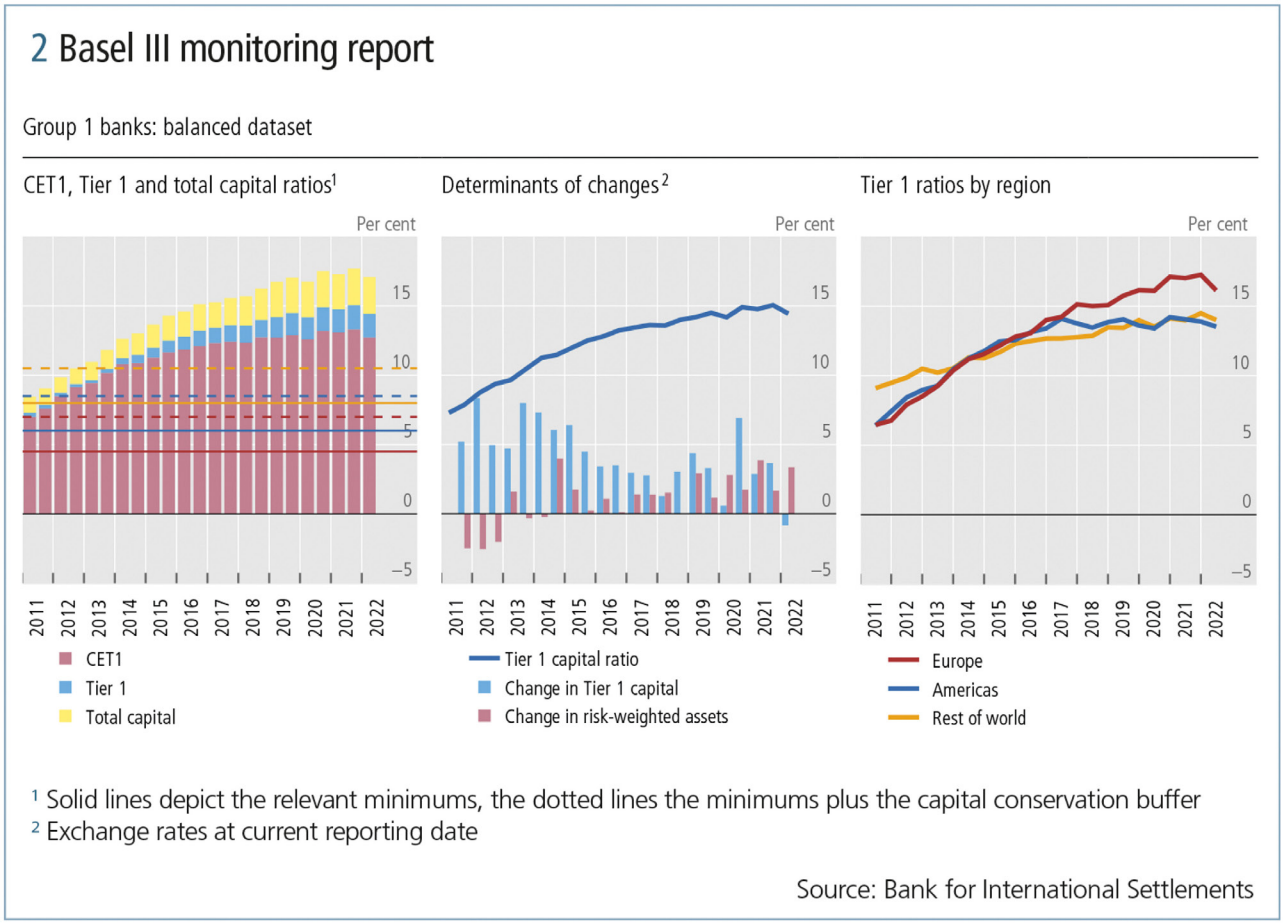
If US regulators limit the role of internal models for credit risk measurement, what does this mean for MRM?

For internal models to be adequately conservative, there needs to exist internal capacity within the bank to assess the model and external regulatory capacity to ensure internal control processes are robust. The desire of revenue functions in banks to increase lending or take larger market positions creates the risk of incentives to hide favourable bias in a model's complexity.

From an MRM perspective, a move towards simpler standardised models would simplify regulatory compliance. Regulators are, however, aware that forcing all banks to use common modelling frameworks would disincentivise innovation and reduce the diversity of opinions on valuation or risk management. This could lead to distortions of markets where pricing is driven by now-identical regulatory capital considerations. Prescription enforcement of common, simpler methodology could worsen the impact of systematic model errors if all participants, rather than a single bank, harness a common flawed model. US regulators are therefore weighing up the transparency benefits against the risk of introducing market distortions; if they conclude that the difficulty of assessing the conservatism of firm-specific internal credit models is intrinsically too high, then standardisation may be the best approach to ensuring adequate conservatism across all regulated entities.

How does adoption of FRTB impact MRM for market risk?

The Fundamental Review of the Trading Book (FRTB) is the part of Basel III that specifically focuses on estimations of market risk for banks' trading portfolios. Basel III already led to a material increase in banks' buffers between 2011 and 2021.



FRTB permits internal model treatment of positions, only where there are liquid markets, to obtain realistic estimates of the historical volatility and correlations of such positions. The risk representations of positions need to capture a sufficient component of their actual market profit and loss and show accurate prediction of historical losses through back-testing. In addition, the testing horizon now extends to all available historical data and less liquid positions need to use larger change horizons. This significantly increases the amount of data that will need to be retained and the comprehensiveness of product treatment within market risk methodologies.

With these more standardised criteria, FRTB shifts discussion about sufficiency of representations that, historically, would be determined by each bank and each regulator to a more standardised format. Model risks still arise where there is market behavioural change, such that different risk factors become dominant, or where position hedging means that a bank builds material exposure to risk factors that are less well modelled or omitted. Model validation can therefore be more focused on models' robustness to market regime change, the quality of the underlying valuation models and the hedging behaviour for intended model usage.

NEWS

Nomura Selects Quantifi for its Advanced Structured Credit Models

Quantifi has been selected by Nomura Holdings ("Nomura") to support its structured credit team. Nomura, a global financial services group with an integrated network spanning over 30 countries, offers credit trading and structured credit solutions for institutional investors.

The complex nature of structured credit products makes pricing and valuation challenging tasks. For firms investing in these products, cutting-edge analytics that can accurately model complex deals and provide independent valuation and risk management capabilities are critical. Quantifi was selected for its market-leading analytics, technical flexibility and high-performance computing.

> ***"We have been impressed with Quantifi's ability to remain at the cutting edge of pricing complex securities and building out scalable, easy to integrate technology."***
>
> *Sukho Lee, Exec. Director, Structured Credit Trading, Nomura*

A growing number of Nomura's buy-side clients leverage Quantifi. Using the same software, Nomura traders and structurers can help their clients model structured credit and better explain how they themselves are pricing trades. Nomura also speaks to investment managers who are interested in trading structured credit but do not have access to the right tools. Adoption of Quantifi's solutions can open up new business avenues for these clients as well as increase distribution opportunities for Nomura's structured credit team.

"Quantifi is the only provider with proven experience in the structured credit markets. With Quantifi, we have access to sophisticated models that match the market," comments Sukho Lee, Executive Director, Structured Credit Trading, Nomura. "Participants in the credit markets from investors to dealers are always looking for solutions that will give them an edge over their competitors. We have been impressed with Quantifi's ability to remain at the cutting edge of pricing complex securities and building out scalable, easy to integrate technology," continues Sukho.

Quantifi is trusted by leading global banks and investment managers that trade diversified credit. It offers the most comprehensive product coverage and advanced functionality available in the market, with tools that measure sensitivities under multiple scenarios, conduct what-if analysis and run stress tests in a consistent manner. Quantifi delivers the tools that firms need to succeed in the valuation, pricing and risk management of structured products.

"We are pleased to partner with a renowned institution like Nomura and see Quantifi become a key component of its structured credit business," comments Rohan Douglas, CEO, Quantifi. "There are new demands and increased scrutiny on accurate, defendable prices as well as on transparency in both pricing models and methodologies. Quantifi is the de facto standard for structured credit modelling. Having access to our models will make it easier for Nomura to structure trades, analyse risks and match valuations with counterparties and clients," continues Rohan.

Webinar: Front-office reboot: How new technology, ML and data science are reshaping trading

With increasing regulatory scrutiny and market volatility, trading desks are seeking tools to help improve operational efficiency, streamline decision making and successfully manage risk. This Quantifi and Risk.net webinar explores how the front-office is moving away from antiquated structuring tools to drive efficiencies and increased profitability.

www.quantifisolutions.com/videos

Whitepapers

- Model Risk Management: Strengthening Model Governance
- How Data Science is Transforming Finance
- Managing Equity Volatility
- The Acceleration of Electronic Credit Trading
- How to Get the Most Out of Your Liability-Driven Investment (LDI) Strategy
- What Drives the Convertible Bond Market?

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About Quantifi

Quantifi is a provider of risk, analytics and trading solutions. Our award-winning suite of integrated pre- and post-trade solutions allows market participants to better value, trade and risk manage their exposures and respond more effectively to changing market conditions.

Quantifi is trusted by the world's most sophisticated financial institutions including five of the six largest global banks, two of the three largest asset managers, leading hedge funds, insurance companies, pension funds and other financial institutions across 40 countries.

Renowned for our client focus, depth of experience and commitment to innovation, Quantifi is consistently first-to-market with intuitive, award-winning solutions.

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