quantifi

Newsletter | Autumn 2022

IN SIGHT

IN THIS ISSUE:

How is Data Science Transforming Finance?

CEO Message

This year marks Quantifi's 20th year in business. As we approach the new year, it's a good opportunity to reflect back on the year to date and to look towards 2023.

This year has been a significant one for Quantifi. It has been another year of strong double-digit growth with important staff hires, key project go-lives, and significant new product innovations. It has also been a great year to celebrate our 20 years with colleagues, clients and friends of Quantifi.

The markets have changed a lot since Quantifi was founded 20 years ago. There have been many drivers from the 2008 financial crisis to the war in Ukraine. Through all of this, however, there has been the constant driver of technology driven innovation.

On the topic, the cover story in this issue of InSight looks at how data science is transforming decision making across trading and risk, banking and investment management. Also included are the findings from a recent survey on how data science is playing an increasingly pivotal role across capital markets. The feature story explores the evolution of credit trading, which 20 years ago was mostly conducted over the phone, and how the arrival of the internet saw the development of electronic trading.

Quantifi is first a software company with a culture of technology innovation validated with our recent award for 'Best AI/Machine Learning Innovation' by Asia Risk. We are also a client centric company as validated by our award for 'System Support and Implementation of the Year', also from Asia Risk.

Looking towards 2023, Quantifi is well positioned with a strong and stable management team, a strong product pipeline, fantastic clients and an amazing team.

I want to wish everyone a wonderful holiday season and a prosperous 2023!

Rohan Douglas, CEO, Quantifi

Contents

NEWS

Arini Selects Quantifi to Support its Advanced Credit Strategies using Python

Arini Capital ("Arini") has selected Quantifi to support its more complex credit instruments. Founded by Hamza Lemssouguer in 2021, Arini is a specialised alternative asset manager that seeks to deliver uncorrelated, absolute returns through a fundamental and opportunistic approach to credit investing.

Hedge funds face a rapidly changing operating environment in which key drivers – including regulation, market structure and investor behaviour – have a profound effect on risk management and its technology. To thrive, firms need to harness the latest technology. Following a rigorous selection process, Arini selected Quantifi to run risk, structure trades and perform stress tests and scenario analysis for its structured credit strategy.

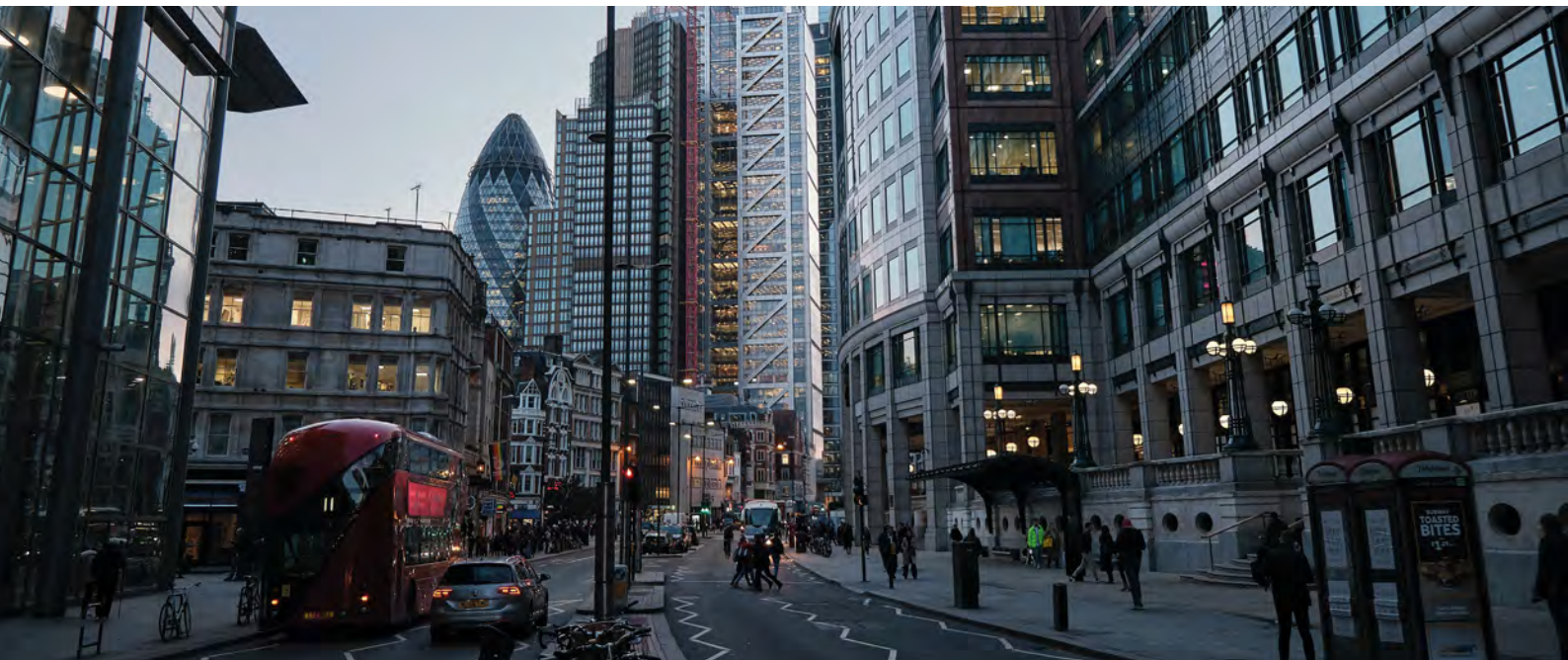
> ***"We selected Quantifi because of its deep understanding of the structured credit market. With Quantifi, we have access to market-leading analytics that are flexible and scalable."***
>
> *Jeysson Abergel, Head of Trading & Macro Strategy, Arini*

For investment managers, Quantifi delivers cross-asset trading, front-to-back operations, position management, enterprise risk management and regulatory reporting, all on an integrated platform.

As well as supporting the key regulatory requirements, Quantifi applies the latest technology innovations to provide new levels of usability, flexibility and ease of integration. This translates into dramatically lower time to market, lower total cost of ownership and significant improvements in operational efficiency.

"We're delighted to welcome Arini to our growing investment management community. Given the complexity of structured credit, we have seen several investment managers make the move to Quantifi," comments Rohan Douglas, CEO, Quantifi. "We have invested significant resources into data science technologies and analytics. A key focus for Quantifi has been to make all our interfaces Pythonic so that it's easy for our clients to get up and running and build their own custom analytics without relying on an internal development team. Early adoption of emerging technologies gives our clients a competitive edge. We look forward to helping Arini drive the operational efficiency and resilience required to support its future growth," continues Rohan.

ARINI



NEWS

Mizuho Americas Partners with Quantifi to Support its Robust Equity Derivatives Platform

Mizuho Americas, an integral part of the Japan-based Mizuho Financial Group, Inc., has selected Quantifi to support its expanding equity derivatives platform. Quantifi will complement Mizuho Americas' existing internal process, providing additional pricing models to further validate its internal models.

Mizuho Americas markets its US equity derivatives capabilities to US corporates, providing solutions including accelerated share repurchases, collars, convertible call spreads, and equity forwards. Quantifi was selected by Mizuho Americas for its responsive service and extensive model library to help supplement its proprietary, in-house technology.

Mizuho Americas was looking for an independent pricing and structuring solution to supplement risk measurement on its derivative positions and price structured equity notes. Quantifi was selected for the depth of its equity analytics and flexibility of its technology. With Quantifi, Mizuho Americas has enhanced its access to fast, accurate pricing and analytics that have been seamlessly integrated with its other internal processes. By selecting Quantifi, Mizuho Americas has saved on development time and resources and can focus on its core business.

> ***"We are delighted to be providing Mizuho Americas, one of the premier investment banks, with technology and support for its equity derivatives business. We look forward to partnering with Mizuho Americas to help it expand its equity offering."***
>
> *Rohan Douglas, CEO, Quantifi*

MIZUHO

CELEBRATING 20 YEARS

Quantifi Anniversary Party

This year marked Quantifi's 20th anniversary and the team got together to toast the company's success. The party was attended by employees and their families who all came together to celebrate two decades of achievements and innovation.

Rohan Douglas, the CEO and Founder of Quantifi welcomed guests and thanked everyone for their contribution. Quantifi's success depends on its people which is why we also took the opportunity to recognise the employees reaching their five and ten year milestones with the company.

Location

The party was hosted in October at the South Place Hotel's Secret Garden bar in the heart of the City of London.

How is Data Science Transforming Finance?

The past decade has seen the rise of emerging technologies across the financial industry and beyond. There are now synergistic groups of technologies that are operating at scale and will further accelerate digitisation, boost resilience and drive operational efficiencies. This is happening around a combination of areas such as high performance computing and software infrastructure via the cloud, advanced analytics and data science.

High Performance Virtualisation	Integration, Connectivity & Automation	Data Sciences	Development Paradigms	Advanced Analytics
- Cloud enablement across the technology stack - In-memory approaches e.g. fast persistent RAM - Lambda architectures (hybrid real-time batch capabilities) - On-demand and scalable computing models - Quantum computing	- Microservices and containerisation approach facilitates modularisation (e.g. Restful APIs) - Next gen robotic process automation (RPA) - Integrate AI to enable smart automation - More dynamic 'frontline to risk to finance' connectivity	- Alternative/ Non-relational databases - Scalable big data lakes - DLT/Blockchain - Integrated data science, analytics and AI/ machine learning development tools and platforms	- OpenSource tool and stacks - DevOps and Continuous Delivery approaches - Agile IT implementation	- Traditional logic and rules-based decisions Cognitive AI - NLP, NLG, image recognition - Statistical analysis - Supervised machine learning - Unsupervised machine learning - AI/machine learning development platforms - Augmentation of man and machine

Data science: make smarter decisions and improve performance

Modern data science approaches and the ecosystem of components that have emerged in recent years, when properly deployed, can enable firms to address some of the current limitations inherent within incumbent risk systems and operations. This may be due to the slow provisioning of computing resources or not having timely access to data. This also includes difficulty with collaborating with peers because of the fragmentation of tools and datasets, as well as a general lack of collaboration features in some of these tools – for example, Excel spreadsheets.

In contrast, having higher on-demand access to large computational resources via the cloud, with high performance fast data stores using in-memory architectures, enables firms to do more ad-hoc analysis, testing and validation of models in a centralised framework, using the most granular levels of data without the need to pre-aggregate or pre-format the data as a whole.

Over the course of the past few years there has been a step change in the role that data and technology play in risk management and investment decision-making.

Powered by data science

A data science powered risk analytics platform typically would have three different components. On the data management side, this would involve on-demand normalisation and curation of the data. The analysis component includes cross-asset financial model libraries, artificial intelligence (AI) and machine learning (ML) tools. The final component is business intelligence (BI) and visualisation, which includes third-party tools such as Power BI and Tableau.

Data	Analysis	Bi/Visualisation
- Integrated security master, portfolio, risk and financial data - Data management: on-demand normalisation and curation	- Cross-asset model libraries - AI & machine learning	- Power BI, Tableau, etc.

All this needs to be implemented in a development environment that provides a fast cycle of model development, from experimentation to production, while enforcing a strong governance structure. This eliminates the fragmentation of production system versus analysis system, which is used by traders, analysts and quants – typically in Excel workbooks – across the organisation. It also facilitates the ability to combine internal data sets with external structured and unstructured data sets and the agility required for experimentation within a production environment.

There are a number of open-source tools and third-party applications available, designed to support the data science process:

- **Ingesting data** Files, data feeds, SQL, HDFS and Kafka
- **Wrangling data** Refine and Python
- **Modelling** Python, Jupyter, R, RStudio and Visual Studio Code, together with the financial and risk model libraries that will be required
- **Testing** DataOps
- **Publishing** Python, Dash or third-party applications such as Power BI and Tableau

How is Quantifi leveraging data science?

A common use case that Quantifi typically sees from clients is leveraging third-party visualisation tools to report on portfolio and risk data. This essentially involves publishing data (not just from Quantifi models) in a format that can be processed by a third-party reporting tool.

A data science-enabled platform

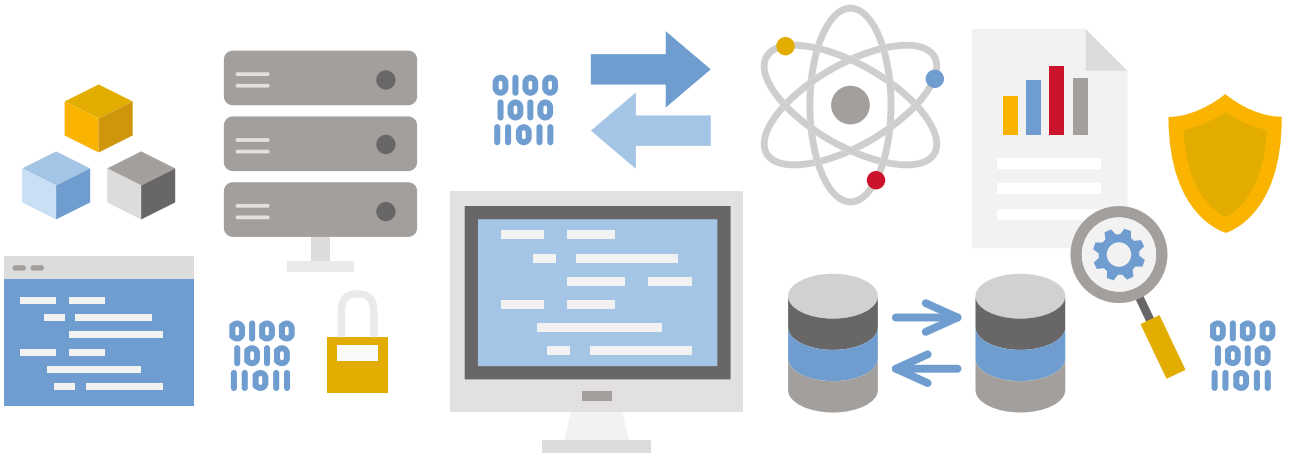
Quantifi has developed a framework that allows a seamless integration of risk analytics, pricing and reference data with popular development and reporting tools. Using Quantifi's data science platform, it is possible for example to extract business objects such as curves, product definitions or pricing models from the Quantifi risk engine (running on the intranet or in the hosted cloud environment) and use these objects in a local Python/ Jupyter notebook (or any other programming IDE). This enables rapid development of ad hoc reports, back-testing tools or custom risk measures, while both ensuring consistency of the custom analyses with the 'official' configurations and removing the burden of recreating underlying business objects from scratch, therefore massively reducing development time and effort.

Back-testing

Here a client might have mixed datasets from diverse sources, coupled with open-source tools such as Python, Jupyter or RStudio, and market standard financial model libraries. This creates an ideal platform for back-testing analysis.

Another example would be correlation trading, where the investor is taking a view on certain risk factors such as correlation. In this case you build a structure that's essentially hedging all the other risk factors and only exposing them to correlation risk. By back-testing it, the investor can see if the performance based on the risk-neutral strategy is closely replicated in the real world.

Lastly, there are other use cases that are driven by regulation. If a bank qualifies for a model-based regulatory capital approach (as opposed to a standard



As with any emerging and disruptive technology, firms need to strike the right balance between innovation and risk management.

approach), its models need to be validated regularly. The regulators will ensure that the bank has proper processes in place to validate those models. One condition is that banks need to regularly back-test those models to ensure they are performant. The same applies to measures such as potential future exposure.

Portfolio construction and optimisation

By using novel optimisation techniques and multiple structured and unstructured data sources, firms can make better investment decisions. For example, with trading strategies based on price, Quantifi has collaborated with a firm that uses AI and ML to forecast bond prices based on data analysis. This AI firm uses Quantifi models for the risk metrics on its platform.

Another option is a weight-optimisation strategy where portfolios are tracking benchmarks or model portfolios based on risk metrics such as variance, returns, Sharpe ratios, duration and so on, and use AI and ML algorithms to make better investment decisions.

To complement and enable these strategies, firms are increasingly seeking alternative data sources. There's a wealth of data that is digitised and easily available and more organisations are using web scraping, crowd-sourced data and social media, along with image recognition and natural language processing.

Key takeaways

The successful implementation of data science capabilities will depend on a firm's responsiveness and agility from people, process and infrastructure standpoints. As with any emerging and disruptive technology, firms need to strike the right balance between innovation and risk management. The race to adopt new technologies poses a level of risk. The most common risks associated with adopting data science are key person risk, IT security and privacy.

Firms not looking to adopt in-house data science capabilities have the option to use technology providers. External providers such as Quantifi, who have embedded data science, can offer a range of features including the ability to compose risk analytics, product structuring and testing, hedge construction and development of trading strategies.

FEATURE

The Acceleration of Electronic Credit Trading

The credit market is undergoing a fundamental shift in the way trades are executed. Until around 20 years ago, most trades were conducted over the phone, by Bloomberg messages and in some cases by email. All of this was classed as voice trading. The arrival of the internet saw the development of electronic trading. More recently, we are seeing the advances in algorithmic trading where algorithms and computers place orders on both client and dealer sides. We have also seen the development of systematic market makers, where computers respond to clients with prices. Today there are a number of combinations of these forms of trading, and they are fast increasing in complexity.

Some fixed income markets have already adopted electronification (for example, US Treasuries and European government bonds). In relatively less liquid sectors — such as investment grade and high yield corporate bonds, emerging and frontier markets sovereign and corporate bonds — the proportion and volume of electronic trades is increasing year on year.

How is Quantifi leveraging data science?

Electronic trading has become an increasingly important part of the fixed income market landscape over the past few years. Some estimates put volumes, by ticket count, at more than 70 percent of all bond trades and 40–45 percent of overall volume by size. This highlights that market participants tend to execute smaller tickets electronically and larger ones via voice; however, this is gradually changing. Aside from the speed and convenience of execution, there are several other factors driving the trend for electronic trading:

- Regulatory reforms in Europe and the US require full transparency of the execution process. This is much easier to achieve with electronic trades.
- New trading protocols and platforms provide participants with more efficient execution capabilities.
- Advances in algorithmic and high frequency trading require dealers to respond with greater speed and accuracy — not usually attainable without some form of automation.
- Finally, while changes in capital requirements and other banking regulations have forced some dealers to pull back from market making in certain areas, this void has been gradually replaced by technological solutions that enable clients to bypass the intermediaries and trade directly with each other.

Electronic trading platforms

Modern technology coupled with regulatory change has affected the economics of intermediation in fixed income markets. The rise of electronic trading platforms has created efficiencies for many market participants and reduced transaction costs. Furthermore, advances in technology have lowered the costs of creating and upgrading an electronic trading infrastructure, which has led to more intense innovation and competition among trading venues. Platform providers are experimenting

The credit market is undergoing a fundamental shift in the way trades are executed.

with new protocols to bring together buyers and sellers. Modern electronic bond trading platforms offer advanced tools for users to control all aspects of the trade lifecycle (pre and post execution).

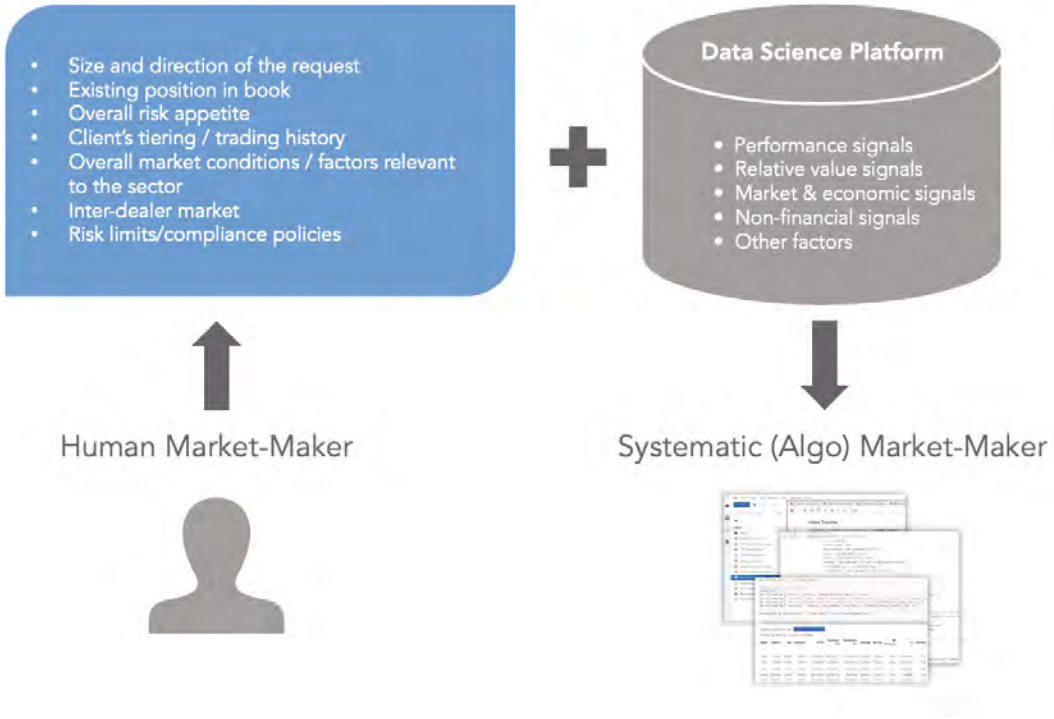
Various platforms and providers have also introduced systems and protocols that bring the trading model much closer to the exchange model used for equities. Tools such as central limit order books (CLOBs), broker matching sessions/auctions and dark pool systems have gained popularity in the past few years. The coverage of supported instruments is also rapidly expanding.

Evolution of trading automation tools

Amid growing competition and advances in electronic trading venues, both buy-side and sell-side participants have seen a steady increase in volumes of RFQs, facilitated by electronic platforms. This has led to the development of aggregation tools and execution management systems (EMSs). These tools enable dealers to quote on multiple platforms and clients to route orders simultaneously to different trading venues. Evolving regulatory requirements add further demands on transparency around pricing, which requires both sides to adhere to strict execution policies.

As trading volumes continue to grow, tools that were designed to allow traders to execute more trades manually (even with the help of electronic platforms) are no longer adequate. High volume trading desks can receive thousands of RFQs a day, and buy-side clients often execute hundreds of orders. Moreover, algorithmic trading is picking up pace, which drives volumes even higher. All these factors give rise to the next generation of trade automation that seeks to reduce human involvement in the market-making process and to replace or augment it with artificial intelligence (AI) and machine learning (ML) techniques.

Automating market-making decision process



Systematic market making

Many of the major market-making banks have started to roll out automated systems to emulate the decision-making process that a trader might follow when responding to an RFQ. By applying advanced ML techniques, an automated market-making system can be trained and fine-tuned on large datasets of historical trade and RFQ data, both public (TRACE) and proprietary. Furthermore, a number of signals can be incorporated into the model, surpassing the capabilities of a human trader. This enhances responsiveness and removes the emotional component from trading.

Some banks have implemented these systems to work independently from the traditional human market makers, usually delegating smaller size requests (or those considered less important) to the machine. Others have employed a hybrid approach, where a trader monitors the performance of AI. The ongoing rise in volumes of RFQs and trades makes the adoption of these tools a necessary condition for dealers to remain relevant.

Fast, accurate analytics is a prerequisite for any automated bond trading or market-making platform. In order to phase out outdated and inflexible infrastructure, buy- and sell-side firms are turning to fintech providers such as Quantifi, which specialises in sophisticated model libraries and pricing frameworks built on new technology.

Portfolio trading

Portfolio trading enables participants to negotiate and execute trades on multiple securities simultaneously without the need for researching best levels, negotiating and executing individual line items.

In a typical portfolio trading transaction, a client will prepare a portfolio of bond positions to execute (usual scenarios are managing inflows/outflows or portfolio rebalancing by buy-side institutions). The client then sends the portfolio to various dealers, who respond with a single price on which to execute the trades. Subsequently, the client is able to choose the best price and execute the entire portfolio with the preferred dealer. Previously, this process involved preparing spreadsheets and exchanging them via email or Bloomberg messages, uploading trades into the dealer's proprietary systems for evaluation and individually booking the trades post execution. Trading platforms such as Tradeweb and MarketAxess have developed advanced trading protocols that allow the execution of portfolio trades electronically. This has greatly reduced execution time and effort and enabled straight-through processing of resulting trades.

Another form of portfolio trading steadily gaining popularity is the exchange-traded fund (ETF) market. ETFs on equities, bonds and other asset classes have been around for a long time, initially created mainly for retail investors as an alternative to funds. ETFs are now becoming popular with professional market participants who use them as macro hedging tools or to express market views. Multiple banks and non-bank market makers support liquidity in the ETF markets. Trading strategies aiming to exploit arbitrage between ETFs and constituents are popular and they further increase overall volumes in underlying instruments.

Advances in portfolio trading

'Traditional' execution model

- Trade individual line items
- Negotiate each price
- Increased bid-offer for illiquid and odd-lot items

Portfolio trading

- Greatly reduced execution time and effort
- Ability to incorporate less-liquid securities and odd-lots as part of a larger portfolio
- Potential savings on bid/offer spreads for portfolios with both long and short positions
- Decreased information leakage

Conclusion

The electronification of fixed income trading has opened up new possibilities for all market participants; buy-side clients can manage their portfolios more efficiently; hedge funds can implement algorithmic trading strategies to take better advantage of market dislocations; market makers are able to respond to a stream of RFQs with enhanced speed and accuracy. The adoption of algorithmic trading, systematic market-making strategies and advanced trading protocols requires firms to embrace new technologies. Integrating ML and/or AI tools into the trade automation process is emerging as a clear trend.

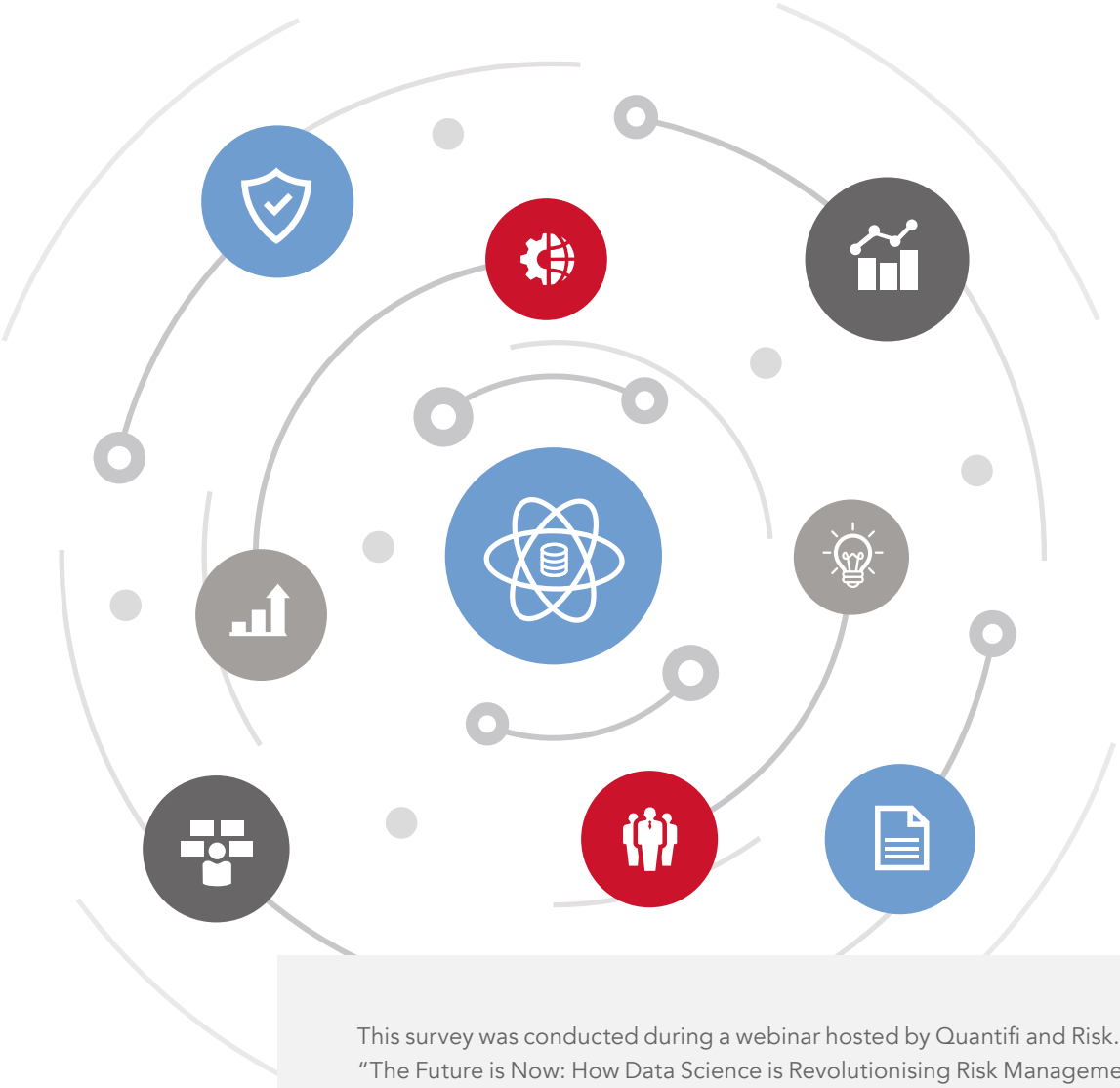
Quantifi integrates with data science technology to provide cloud native, scalable performance for large data sets. This enables clients to do more complex data analysis with larger data sets and to produce flexible reporting with clear, actionable results. Advanced financial analytics and technology, as provided by Quantifi, is designed to help market participants accelerate their adoption of this rapidly developing market.

1) Flow Traders/WBR whitepaper Beyond the inflection point: the future of credit trading

SURVEY

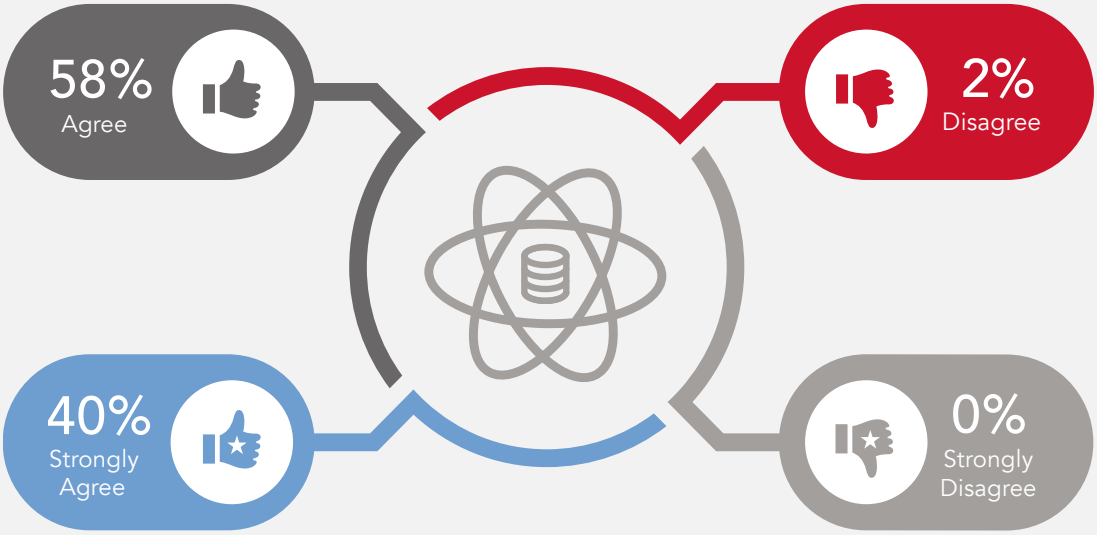
Four Ways Data Science is used in Finance

The financial services industry deals with increasingly large volumes of data. With data volumes growing, buy-side and sell-side firms are exploring data science techniques to better understand risk and opportunity, but may struggle to maximise value from these projects due to limitations with systems, skills and resources.



This survey was conducted during a webinar hosted by Quantifi and Risk.net on "The Future is Now: How Data Science is Revolutionising Risk Management and Finance", with guest speakers from Citi, JPMorgan Chase & Co and Prudential. More than 250 individuals from across the financial services industry registered for the webinar and were invited to participate in the survey.

To what extent do you agree that data science delivers better decisions in investment securities than previously possible?



Technology is central to modern investment decision-making and over the past two decades there has been a fundamental change in the way that data is analysed. The combination of an increasingly complex world, the abundance of data and the pressing desire to remain ahead of competition has prompted firms to focus on using sophisticated analytics for driving strategic business decisions. Rather than relying on human-based intuition, data science is helping firms streamline their investment process by allowing them to better manage, assess, and refine idea generation, portfolio construction and risk.

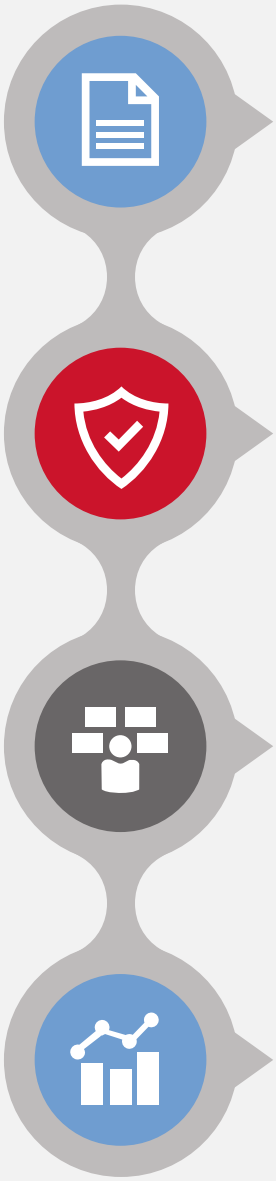
Ninety-eight percent of respondents agree that data science delivers better decision-making than has been previously possible.

This suggests that the use of data science is accelerating as firms look to make better, more informed investment decisions.

Quantifi supports data science and provides clients with the ability to do complex data analysis and flexible reporting using Python, Jupyter and other popular data science tools. Clients benefit from complex user-driven analysis, strategy back-testing, ad hoc portfolio what-if analysis – all using mixed data sets from diverse sources.

Buy-side and sell-side funds are grappling with the tools to better understand risks and opportunities in systematic market making, algorithmic trading, risk management and compliance and regulatory reporting.

I am using data science tools in (select all that apply):



35%
Regulatory Reporting

87%
Risk Management & Compliance

26%
Algorithmic Trading

9%
Systematic Market Making

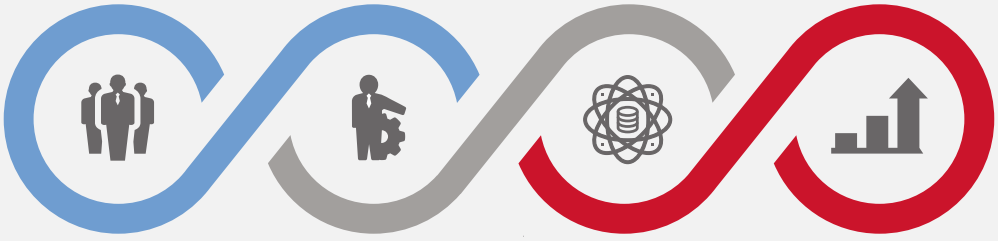
The financial industry deals with large volumes of unique data and this data comes with some characteristics that other industries do not share. This has a huge impact on the different applications of data science within finance. Of the various use cases included in the survey, participants selected risk management and compliance (87%) as the most common use case, followed by regulatory reporting (35%).

Risk management and compliance is an integral part of any financial firm and is highly dependent on data. The new age of data science offers a level of sophistication that is helping firms better understand the dynamics of their business, anticipate market shifts and manage risks. One example of how firms can gain an advantage using data science is when they need to run highly complex calculations and simulations on large portfolios/large data sets for pricing and valuations.

Quantifi has stayed ahead of the competition by continuing to make smart investments in emerging technologies and next-generation approaches including data science. A common use case Quantifi has seen amongst its clients is back-testing, whereby clients combine Quantifi's analytics and risk tools with mixed datasets from diverse sources and open source tools such as Python, Jupyter, and RStudio. This creates an ideal platform for back-testing analysis for portfolio and product structuring. If a portfolio manager constructs a portfolio or a trader structures a product, before they execute on the portfolio or product they back-test it against current historical data or stressed historical data to anticipate how the portfolio or product would perform.

Quantifi provides open, seamless and easy to use integration with popular data science tools. This gives clients a powerful and flexible environment for the next generation of analysis and reporting.

What is driving data science in investment securities?



45% People

0% Regulators

35% Data/Data Science

20% The Market

People (45%) and data (35%) are seen as the most significant drivers of data science, while the market (20%) is also considered a significant contributor.

Several years ago, the first of the data scientists were developing interesting proof of concepts; however, they were never used because no one on the business side was involved in the development, and therefore did not understand the benefit. Today, data science has become a real game-changer in how data is absorbed and analysed. Data science has one primary limitation: context. While data science is seen to be extremely effective, it is meaningless without the people that know how and/or where to apply it efficiently. This is where individuals that are capable of both analytics and critical thinking come into their own.

Whilst there are many proponents of data science, people are also the main opponent at many firms. These opponents are the ones that need to be convinced of the value of what data science can do by seeing small pieces of value iteratively, that can then be expanded and extended across other areas of activity. From this perspective, the people element is important and many individuals working in data science can end up feeling like salespeople for their own skillset.

The proliferation of data and the tools required for processing this data, combined with the advances in available computational capacity, is also driving data science applications even further.

Lastly, market structure is rapidly changing in such a way that automation is becoming a prerequisite to remain competitive. This is only possible by implementing processes centred on data science and AI that are designed to condense and automate lengthy manual tasks into a few seconds. This, in turn, allows individuals handling large amounts of data to focus their time on running analysis concentrate on critical business outcomes.

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

- 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
- A Primer on the Equity Derivatives Market
- 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.

enquire@quantifisolutions.com | www.quantifisolutions.com

EMEA +44 (0) 20 7248 3593 NA +1 (212) 784 6815 APAC +61 (02) 9221 0133

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