



Algorithmic execution

Harnessing technology to manage risk

Technological innovation continues to provide market participants with access to increasingly sophisticated risk management tools and strategies. Senior executives at HSBC discuss how organisations can make the most of cutting-edge solutions such as algorithmic execution models

As technology becomes more embedded across the global financial markets, organisations must develop infrastructure with a keen eye to future innovation. As a result, there is a real need for scalable solutions that can help market participants design strategies that suit today's markets, but can also adapt to fit tomorrow's changing trends. The right provider can ensure access to the necessary tools, knowledge and expertise to allow these organisations to develop risk management capabilities and implement strategies that are fit for purpose in fast-paced financial markets.

The current trend towards the use of algorithmic execution models in markets such as equities or foreign exchange is a case in point: when buy-side organisations can access the right tools and technology, new ways to manage risk and develop innovative trading strategies are possible. So, could algorithmic execution be a game changer? HSBC anticipates algorithmic execution growing in significance and has developed a cutting-edge infrastructure that supports the development of such strategies across asset classes.

The rise of automation

A search for greater efficiency among buy-side organisations and a need to reduce costs has contributed to the current trend towards the use of algorithm-based execution models, according to Paris Pennesi, director of FX E-Risk at HSBC. He sees automation being increasingly used in the foreign exchange market to enhance workflow processes and risk management activities, allowing organisations to understand and better manage their risks, and to achieve best execution. Automation was initially implemented for liquid currency pairs and is now beginning to spread to other, less liquid, products. "Once an organisation starts this process of automation, there is a need to build infrastructure, and once it has the necessary infrastructure in place a lot more data is generated. That can then be captured



Richard Anthony, Global Head of FX E-Risk

and analysed by quants and technology professionals and used to improve the models that underpin the automation of the trading process," he says.

Mahmoud Elarbi, global head of central risk book at HSBC, adds that the trend towards greater – or even total – automation seen throughout the financial markets in recent years is a direct consequence of a more fragmented and complex market. Organisations are also often driven to use tools such as algorithms due to pressures from other entities, primarily competitors and regulators, he says. "Even if an organisation steers away from automation, its competitors will become more sophisticated in this way. Plus the changing regulatory framework produces additional pressure to automate. When it comes to increased obligations in relation to best execution and trade reporting, it is very difficult to see how an organisation can comply without using algorithms. They are given a list of rules and must show that orders have been routed according to the best interests of their clients, which is a very difficult task without automation and good algorithms."

Richard Anthony, global head of FX E-Risk at HSBC, agrees that organisations are increasingly drawn to algorithmic execution models because they can help prove best execution to clients.

"There is certainly an increased focus on proving best execution," he says. "And, while we would not suggest that using algorithms is the only way to achieve best execution, the products that are typically available in an algo suite support the use of transaction cost analysis (TCA) and can help asset managers to prove best execution to asset owners."

Developing innovative models

HSBC has made a number of structural changes to position itself at the forefront of development in this area. In a bid to anticipate what the 'dealing room of tomorrow'¹ could look like, it has embraced the trend towards data-driven trading activity seen across the financial markets in recent years and has fully embedded this emphasis on data across all areas of its business, including risk management and product development. As a result, HSBC's development cycle is designed in a way that allows it to implement faster and thus provide more robust and accurate algorithmic solutions.

Elarbi says this has led to a greater emphasis on measuring execution quality and TCA in order to optimise trading performance. "Pre-trade, we plan how to trade and then, during the trade, we support the client with guidance on the market volumes, liquidity, spreads, and so on. Post-trade, we also measure execution. It's a feedback loop: we develop a plan, manage the plan and then analyse the post-trade data to provide guidance for the client's next trade."

In the foreign exchange space, HSBC offers a holistic range of solutions to address risk management, which are developed and implemented by a team of quantitative analysts and traders and underpinned by a robust governance process. The development process brings together independent teams to collaborate, challenge and enhance; the

¹ HSBC, *The dealing room of tomorrow*, www.gbm.hsbc.com/dealing-room-of-tomorrow



Mahmoud Elarbi, Global Head of Central Risk Book

team of quants that design and develop algorithms works closely with the technology specialists that deploy the code. This relationship is key to managing the risks associated with using algorithms, says Anthony. "The technology team provides a key safety feature that would not exist if the quants were to deploy the code themselves," he explains.

The quants research, develop, design and conduct on-desk fact-checking, before passing the algorithm to the technology team to code and undertake a robust approval process that involves compliance processes, independent model reviews and other key stakeholder approvals. "That gives us a technological advantage, but it also helps us to work efficiently, which ultimately allows us to provide our clients with a better service," he adds.

This approach has led to similar changes in other areas as well: "The relationship between our team on the trading floor and the technology team is also much closer than it would be with a traditional trading desk," adds Pennesi, who maintains the development cycle for new algorithms is faster and more accurate as a result, while remaining robust. "There is a new dynamic and that brings efficient synergies; they have a better understanding of what we are trying to achieve in the front office and how they can support us step by step throughout the whole process."

Creating the infrastructure

While providers such as HSBC have already positioned themselves to address future trends such as data-driven analytics, clients must follow suit in order to benefit from this new technology. But what do market participants need to do to access these tools now, and how can they implement infrastructural changes that will allow them to benefit from continued developments in this area?

HSBC's current offering allows market participants to harness the bank's algorithmic research, development and technology to manage the risks associated with trading. While the bank's market-making activities are completely separate from client services and treated fairly, the underlying algorithms used for each are the same. This means clients

have access to the same execution algorithms that HSBC uses for its own day-to-day risk management. "The investment we have made in technology and quantitative models has put us in a very good position to help our clients to profit from the knowledge that we have built up over many years," Elarbi says. "We must recognise that this is a lengthy process and, to get this right, it takes time and effort."

The foreign exchange algorithms developed by HSBC are third generation in that they adapt to changing market conditions such as liquidity or volatility. The client experiences none of the complexity of building the solution, which is designed by HSBC to be easy to implement. "Our aim is to build a very simple yet sophisticated offering," Pennesi says. "Each algorithm has a very specific and dedicated objective, for example, an algo might be designed for a client that has a very short-term alpha, while another could be created for a client that doesn't have an immediate need for execution."

All of the algorithms share the same quantitative framework and are subject to a strict review and approval process, as Anthony explains: "An independent review is conducted to ensure the algorithm is compliant with all associated regulatory requirements or trading venue rules, and the model review process involves an independent team of quants that look at the mathematical efficacy of the models that have been developed to ensure they are fit for purpose. They will discuss and debate the underlying model assumptions with the quants and are also involved in the implementation process to ensure the algorithm is doing what it should be doing once it is in production. All of these elements provide a very strong governance framework that underpins our offering."

Looking to the future

Pennesi says this focus on analytics and data-driven models will only grow in the future, and that HSBC will concentrate specifically on developing simulation tools. "This is the approach we have already adopted and we envision a growing demand among our clients to be able to run their own simulations and create their own models and analytics to gain an understanding of when to trade and the best way to execute a trade," he says.

Our clients are already interested in accessing better post-trade analysis tools, and that has sparked interest in pre-trade analysis, according to Anthony. "Asset managers have been able to use TCA to answer performance-related questions, but many now want to use such analytics to determine which banks to work with," he says. "When to execute and with whom are the key questions for clients going forward, and I think they will be able to find an answer using the analysis that we provide through these simulation tools."



Paris Pennesi, Director of FX E-Risk

As pre-trade analysis becomes an increasingly important tool for organisations that are looking for new ways to trade, technology will continue to be a key factor for clients. Providers with the right infrastructure will have the means to offer tools that can support such research. Elarbi sees HSBC's role as that of a consultant, using its TCA platform to help clients to understand market changes from an execution point of view for themselves. "For us to be able to do that, we have invested a lot in building a platform that allows us to measure the quality of execution and perform a full analysis to understand the market and provide support to clients with respect to best execution."

As such, Elarbi emphasises the need for all market participants to continue to push for innovation when it comes to technology and to maintain investment in analytics and quantitative models for trading. "The key is to have a robust analytics framework that will allow users to monitor liquidity, make predictions about volumes and spreads, and access intraday risk models to allow for better execution management," he says. "At the same time, it is important to continue to build new algorithms to address the liquidity issues that will occur as a result of market changes such as new regulations."

New technology continues to push boundaries in the financial markets. HSBC has examined the likely future direction of the market and is focused on the dealing room of tomorrow in response, answering the call for more data-driven strategies seen across the market in recent years. With the necessary investment in technology and the right industry partners, the possibilities for strengthening risk management and trading strategies will only continue to develop for those organisations that also want to be at the forefront of innovation in this area right now and in the future.

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