

The Search for Execution Quality Part One: The Role of Analytics

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Regulatory change, competition, market fragmentation, and other factors are driving buy-side and sell-side firms to implement analytics systems to help them improve trading quality and reduce the cost of compliance. This two-part white paper explores best practices for approaching and planning such implementations.

Introduction

Capital markets have undergone significant changes in recent years, and buy side and sell side firms have implemented wide-ranging solutions intended to optimize their execution quality. New regulatory requirements like the Markets in Financial Instruments Directive II (MiFID II), as well as increased competition and other factors, have driven these efforts.

Although these changes have increased transparency, firms often fail to obtain the full benefit of the data they are collecting. Many efforts to achieve "best-execution" models, which should be focused on trade execution quality, have instead produced reports focused on breaches. What financial firms need are systems that provide traders and managers with actionable information that will help improve the overall quality of their trades.

This paper describes the trade execution quality challenges that firms face and articulates the need for a comprehensive firm-wide analytics approach for understanding and improving trade execution.

The State of Play: Compliance and Quality

Numerous technology vendors and firms are developing and implementing solutions to comply with regulations affecting trading, including MiFID II and the European Union's Market Abuse Regulation (MAR). Ideally such solutions ensure compliance and also reduce its cost – without slowing down profitable trading operations.

Looking back, we can see that the regulations governing trading technology have become progressively more complex over the past twenty years. The rudimentary Regulation ATS (for alternative trading systems), implemented in 1998, merely defined three guiding principles for trading in an automated environment: fairness, access, and transparency. Then, in 2005, the SEC implemented the more complex Reg NMS (National Market System), which was designed to protect orders.

The Securities and Exchange Commission (SEC) and the European Securities and Markets Authority (ESMA) now mandate that firms improve trade execution accuracy and quality. (Note that, because no single body governs the top public trading markets in the Asia-Pacific region, markets there create unique challenges.)

Transaction Cost Analysis (TCA) is one measure of execution quality; firms need effective ways to identify all the factors that affect the price of an executed order. They also need systems that support an ongoing information feedback loop that enables traders to alter algorithms, change execution venues, and select different liquidity providers to reduce costs and increase trade profitability.

Other factors beyond new technology and regulations have contributed to the complexity of the trading environment. For example, the New York Stock Exchange no longer has a near-monopoly position with more than 90 percent of listed securities (by volume). Today, the United States market is highly fragmented, with roughly 14 exchanges and more than 40 "dark pools." Clients demand change frequently; they seek customized algorithms that support optimum trade execution based on their own benchmarks, with transparent access to trading data so they can easily measure performance.



Best execution solutions vary between the buy and sell sides, but both sides seek tools to help the trading desks better understand the current execution quality of their trades. Some firms have implemented large, expensive, and timeconsuming projects focused on supporting MiFID II requirements. In nearly all cases, those projects have greatly improved trading data storage, and most have also improved data quality.

However, too many of these projects have failed to give traders the tools they need to optimize execution quality. Many firms have implemented MiFID II projects without reaping real value from all the data they've collected, and it is common to see best execution reports that report breaches but fail to suggest how to improve execution quality.

Further, the data environment that supports compliance, including the trade and trader surveillance required by Markets in Financial Instruments (MiFIR) regulation, and the environment that supports trading analytics are often blurred. The visual displays that support the compliance are often nearly identical to those that support the trading teams, even though their objectives differ. This blurring creates many quality-improvement challenges: often the people responsible for ensuring best execution are unable to see the most relevant trading activity problems.

Reporting practices have also evolved. End-of-day Transaction Cost Analysis (TCA) reporting is less important today because alerting a customer about an execution problem after an order has been fulfilled is no longer adequate. Firms need trades to be visible in "real time" as well as the ability to notify clients about problems – and, ideally, to communicate solutions to those problems – while the order is still being executed. Real-time analytical tools make such responsiveness possible.



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Transparency is key. Historic views of trading data support investigation, back-testing, and optimization of trading processes. Visual displays showing events tick by tick – nanosecond by nanosecond with sequence IDs – were once available only in the surveillance department but today are used on the trading floor as well, where they enable quantitative analysts ("quants") to investigate market microstructures throughout the trading day.

Market microstructure has brought order book analytics into focus. Analysts have shifted from looking at National Best Bid and Offer (NBBO) data to visualizing full book depth, which includes all the firm's executions and order messages



(new orders, replacements, cancels), as well as order duration, message rates by algorithmic strategy, market health, and the firm's impact on markets.

As the data has become both more fragmented and more complex, the number of salient metrics through which it can be analyzed has also increased. Simple statistical approaches for comparing current performance against expectations and predicting how an order will be executed are no longer sufficient. Quants are analyzing trades using more multivariate approaches that range widely from fairly simplistic decision trees to complex neural networks.

Using the most advanced systems, they can continuously compare real-order execution metrics against their predictions. Trade monitoring has evolved to answer two questions simultaneously: How does the order execution compare relative to its peers and the overall market? And how closely does the order execution follow the predicted path?

The Analytics Cycle

The process of analyzing trade order execution – the "analytics cycle" – comprises four different phases, the most important of which is data gathering.

The data come from multiple sources, including reference data from the cloud, execution data from the firm's ordermanagement system, market data from various exchanges, and information from Bloomberg, Thomson Reuters, and even Twitter. Regardless of its source, the data must be clean and accurate.

The next phase involves applying such tools as artificial intelligence and machine learning to the clean, accurate data to give traders useful visualizations so they can clearly see what is happening both in real time and in hindsight.

In the third step, analysts extrapolate from the analyses and visualizations to identify possible trading opportunities and threats and then to develop trading algorithms to capitalize on those opportunities and avoid those threats.

In the final, post-trade analytics phase, the analyst seeks to answer the question, "How did we do?".

The cycle then repeats, and every post-trade analysis generates new data that gets fed back into the system.



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Driving the Search for Execution Quality

Beyond regulatory compliance, three additional factors drive the search for tools to optimize execution quality: margin erosion, consolidation, and the availability of in-house quantitative expertise.

When margins were good, firms didn't worry as much about TCA. But the use of increasingly sophisticated execution algorithms carried out by machines – rather than discretionary trades carried out by individuals – has shrunk margins. Firms are now engaged in an "arms race" as they seek to capture liquidity and preserve their alpha.

As margins thin, firms also tend to expand their range of activities and begin trading in new markets and/or asset classes. For instance, a firm might start in U.S. equities, expand into North American equities, then move into European equities or add futures or options to what had been an equities-only business. As firms expand, they should implement systems that enable them to use the same analytical tools across all asset classes and markets to obtain a complete, firm-wide cost analysis.

Finally, firms seek to better leverage their in-house quant expertise to optimize algorithms, which requires understanding their cost models. The cost model involves both explicit costs, which are easy to understand and include brokerage fees and commissions, as well as exchange fees and commissions based on the Maker-Taker Rule. On the buy-side and the sell-side, in-house quants should avoid getting bogged down simply writing more and more code. Managers should monitor trading quality and costs, and use their analytics systems to trace improvements back to the quants' work.

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Mr. Rao was assisted by Louis Lovas and Peter Simpson of One Market Data in the development of this white paper.

Part one of this white paper has explored the factors that drive the search for execution quality and what an effective trade order execution involves.

In part two, we discuss the challenges to implementing execution optimization solutions.

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