LMAX Exchange: **TCA white paper V1.0** - May 2017

TCA metric #5

TCA and *fair* execution.
The metrics that the FX industry must use.

An analysis and comparison of common FX execution quality metrics between 'last look' vs firm liquidity *and* its financial consequences.

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TCA white paper conclusions

In this paper we have analysed a third party trade database, which included both firm and last look liquidity, from the buy side perspective with three questions in mind:

- Do the commonly used TCA metrics accurately measure execution costs on both last look and firm liquidity?
- What are the metrics that measure all the underlying processes of trading firm liquidity, and thus should be used to properly assess the cost of trading in the FX marketplace?
- How does the total cost of execution compare between last look and firm liquidity?

Focusing mainly on three common TCA metrics (fill ratio, price variation and hold time), our findings demonstrate that naively applying the 'standard' execution quality metrics which have been developed for last look liquidity does not provide the full picture of execution costs. More importantly, it misses quantifiable positives of trading on firm liquidity.

In particular, the analysis demonstrates that for firm liquidity, fill ratio and price variation on limit orders are linked and both are related to price volatility, thus purely driven by market dynamics. For last look liquidity, fill ratios are subject to LP discretion and the asymmetrical application of price improvement indicates that there are additional commercial factors in play. Though fill ratio and price variation remain useful separate metrics for last look venues, on firm liquidity venues these two metrics don't measure any business process - they measure market volatility.

Comparing fill ratios between last look and firm venues is not a useful exercise in comparing like with like, and price variation must also be included for a complete picture. The cost of hold time, non-existent for firm liquidity, is an important hidden cost of trading with last look; our analysis estimated this cost at $25/million for a rejected order. Finally, market impact, not usually measured, is crucial for understanding execution quality across both liquidity types.

As a result, strategies that work well on last look venues may not translate to firm liquidity. They translate less when you mix the two. In the example of the limit order price-sniping strategy employed by the TPA, a simplistic application of the basic metrics of fill ratio, slippage and hold time would not show the value firm liquidity brings through price improvement and more consistent execution latency:

- Swapping price improvement for fill ratio is possible with firm liquidity - placing the trader directly in control of their execution costs. If a higher fill ratio is important that can be chosen over increased price improvement;
- The underlying processes of the LMAX Exchange anonymous central limit order book hold challenges and opportunities for customers used to trading with last look venues. There are higher market data update rates to contend with but faster and more consistent execution. We have shown several ways to place a value on that fast execution by calculating the cost of last look hold time, regardless of whether hold times are unilaterally applied to all orders or selectively applied and visible as extended tail latencies;

TCA white paper conclusions

- **Last look optionality is used as a defence for the LP against stale prices in the market. That discussion normally focuses on fill ratio and spread. It does not explain the observation that the market processes that naturally lead to price improvement in market orders are conspicuously absent for limit orders sent to the same venues, or the skew towards slippage and away from improvement seen with some venues. Only firm liquidity venues expose the same underlying market dynamics for market and limit orders.**

We have also introduced some new metrics to TCA, particularly market impact, or assessment of how correlated the flow is. This allowed us to understand the abnormally high fill ratios from the last look LPs seen in the TPA data in context with what institutional customers have shared with us as their view of 'normal fill ratios'.

Put simply, the trade flow of the TPA and its execution strategies create some of the worst possible conditions to showcase the value of LMAX Exchange against last look liquidity providers. Even so, the comparative TCA calculation (described in Part III) demonstrates that for each scenario, due to the absence of price improvement combined with a net cost increase associated with trading after a discretionary hold time, trading costs on last look are higher by between $2.25/million and $48.86/million. Furthermore, the transaction cost analysis showed the benefits of firm liquidity as the transparent, cost effective choice that places the trader in complete control of their execution quality, with no pre-trade information leakage.

It is hoped that this research will spark discussion across the industry on how TCA can be standardised in a way that creates clarity and promotes choice for traders. Our goal was to assist in driving the debate about TCA and contributing to the formation of a common baseline on what is important to measure, how to measure it and how to assess the cost.

Ultimately, once there is agreement on core metrics, the arithmetic that underpins TCA is straightforward. The challenge for the industry is to reach consensus on which factors should be considered and how the different metrics should be calculated. In doing so, it must properly reflect the distinctive nature of firm liquidity and correct the current imbalance of favouring strategies optimised for last look trading venues.

There are undoubtedly limitations to the research presented here. The data sets need to be widened and more detailed analysis of the five core metrics outlined (fill ratio, price variation, hold time, market impact and bid-offer spread) is required, including a deeper focus on variable trading and market scenarios, from order size to time of day, different currency pairs and the impact of major news events. LMAX Exchange will continue to publish further research in this area, drawing where possible on new data.

We encourage industry stakeholders to view this analysis as a starting point towards development of a commonly-agreed TCA framework, one which will need further research and development to refine. We welcome all feedback and critique on what is set out here.

We would like to thank our colleagues and the many customers of LMAX Exchange, forward looking liquidity providers, market makers and TCA experts who have helped formulate this analysis over the last 12 months.

Contact

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