

Dark Pool Execution Quality: A Quantitative View

By: Jeff Alexander, TABB Metrics; Linda Giordano, TABB Metrics; and David Brooks, The Boston Company Asset Management, LLC

Following the release of “Flash Boys” in March 2014, the industry debate around the factual veracity of Michael Lewis’s narrative has been incessant. Beyond the rhetoric, what has become painfully clear is that stakeholder arguments, whether for or against, have been scarcely supported by meaningful evidence. In this vacuum, noise has prevailed over the signal of quantifiable analysis.

TABB Metrics, the TABB Group data analytics division, through its Clarity venue and routing analytics service, analyzed 10 months of The Boston Company Asset Management, LLC’s US equity trading data to determine its dark pool execution quality¹.

The results of this analysis were presented at the Cowen ATM Themis Trading 2nd Annual US Equity Market Structure Event in June 2015. This is an abbreviated paper based upon these findings. The full findings will be released in September 2015.

Data Latency and Pricing Accuracy

During the past year, a great deal of popular discussion focused on latency arbitrage and the timing differences between the consolidated SIP and Direct Feeds (both methods of streaming market data); specifically, the ability to profit from latency differences between fast direct feeds and the slower SIP. With a significant enough latency gap, fast firms can act with “advanced” knowledge of new price changes against slower participants that don’t possess the same level of awareness.

Beyond traditional latency arbitrage, we found a pattern in some pools that pointed to **systemic latency** challenges that caused fills to occur at stale prices. This latency is different than the dissonance between direct feeds and the SIP, especially as some of the challenged pools were using direct feeds as their pricing source. The cost associated with the time it took for slower matching engines to process market data was at times 50 times greater than the SIP-versus-Direct Feed lag.

Said another way, “Flash Boys” identified a window of time in which an investor could be disadvantaged. We are saying the window is far, far bigger and more impactful than The Boston Company and other institutional traders ever imagined.

A New Term: ‘Latency Tax’

The cost to investors who are adversely impacted by this gap can accurately be labeled a “latency tax,” a broad term that considers the cost of transacting in a pool due to infrastructure and processing lags, exclusive of latency arbitrage.

¹ The results discussed in this study are compiled by TABB Metrics’ Clarity service from The Boston Company Asset Management, LLC’s US equity trading data and should not be assumed to be consistent across brokers, trading venues, or investment managers. Each institution’s data will be different. The dataset includes the period of July 2014 to May 2015. The dataset includes routes and fill data from five brokers. The only data excluded were routes and fills missing timestamps in millisecond granularity. Pools with de minimis activity were also excluded from aggregate analysis.

The Latency Tax is the difference between the intended price and the actual fill price:

- Intended Price for a midpoint peg order is the midpoint of the NBBO, based on direct feeds at the time of execution.
- Fill Price is the actual price received.
- Fill Price can vary from Intended Price due to system latency or a differential between SIP and Direct Feeds.

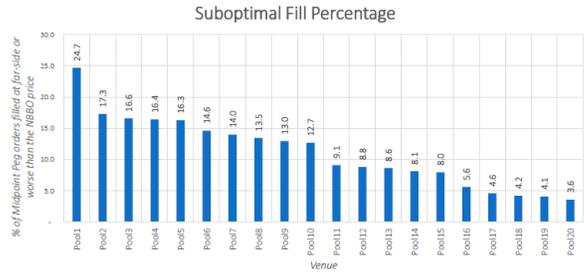
With the permission and aid of The Boston Company Asset Management (TBC)², TABB Metrics is publishing a portion of our Clarity analysis of TBC data to illustrate the importance of latency tax to every institutional investor in the marketplace.

A sample of TBC’s Clarity* Data

Focusing only on midpoint peg orders (broker instructions to trade at the midpoint between the best bid and offer):

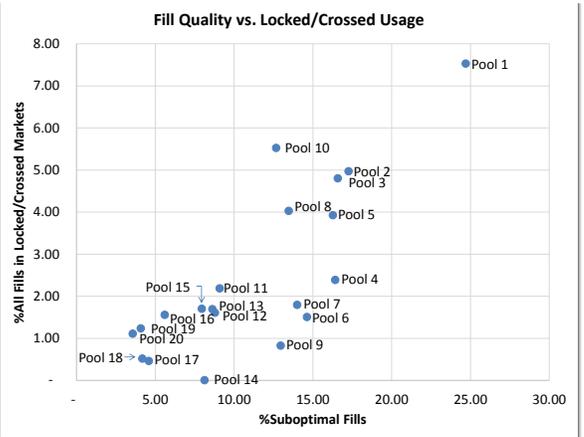
- We found in analyzing TBC data that the least-effective ATSs priced midpoint peg orders at the far-side touch or worse in as many as 24.7% of their fills (see Exhibit 1).³
- We defined these types of fills as **suboptimal**.
- In addition, we found that of 20 pools analyzed, 3 printed more than 5% of their midpoint fills outside of the bid/offer spread (NBBO).

Exhibit 1:
Resting Midpoint Peg Orders Filled at the Far-side NBBO or Worse



Source: TABB Metrics: Clarity – The Boston Company Data (permission granted)

Exhibit 2:
Suboptimal fills vs. Locked/Crossed Usage



Source: TABB Metrics: Clarity – The Boston Company Data (permission granted)

² Note that all TABB Clarity data is gathered and analyzed under strict NDA and can only be released with permission of the client. The release of this data was permitted by The Boston Company.

³ Market data is provided by Thesys Technologies, which is the same pricing engine selected by the SEC for its MIDAS market data program.



Why does this happen? The least-effective pools *believe* that the midpoint is accurate because they are slow at obtaining, calculating, and or striking a midpoint price, when, in reality, the fast trader knows that the price is stale.

Locked/Crossed Markets

We noticed that decreases in fill quality for The Boston Company were clustered around periods when the market was locked and/or crossed. We observed a direct positive correlation between the percentage of fills inferior to the NBBO and the proportion of resting midpoint peg orders executed when the market was locked or crossed (see *Exhibit 2*). It appears that the trading activity of counterparties increased in less-effective pools during these periods because there are potentially greater opportunities to transact with resting orders at off-market prices.

Favorable Momentum

We also observed that when the market was moving in TBC’s direction (TBC buying and market moving down or TBC selling and market moving up), especially prior to a locked/crossed market event, the most-effective ATS executed 22.5% of TBC’s resting orders worse than the midpoint, with the least-effective platform executing **all** (100%) of TBC’s midpoint orders worse than midpoint (see *Exhibit 3*).

This means that when the market was moving in TBC’s direction, between 22.5% and 100% of TBC’s midpoint fills were priced worse than the midpoint, and not in the client’s favor.

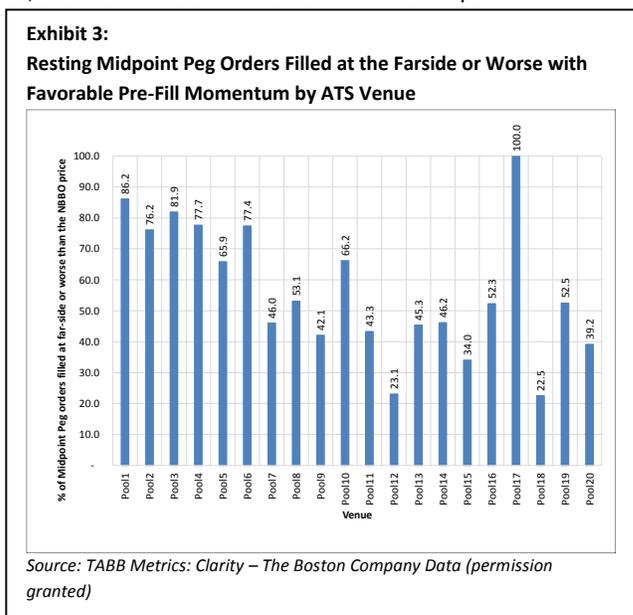
As all (100%) of these passive fills should have been priced at the midpoint, even the best venue’s suboptimal fill rate of 22.5% is woefully insufficient.

Why would this behavior occur in favorable momentum conditions? Assume that the market on a stock is \$50/51, meaning that you can sell the stock at \$50 and buy at \$51. If the price moves up to \$51/52, and you can buy the stock from TBC at \$50.50 (the midpoint price before the stock move), you would realize a minimum profit of 50 cents a share.

This is only possible because the pool’s latency manifests itself in a manner that has it believing the NBBO is still \$50/51.

If pool latency did not present systemic profit opportunities for faster market participants, and this was only a technology issue, you would assume that this behavior would occur with a random distribution and TBC would receive clustered fills in both unfavorable and favorable momentum conditions. We did not observe these results in the data. For example, in Pool 1, fills in positive momentum conditions occurred 12 times as often (24% of all fills) as they did in negative conditions. In pools 12 and 18, however, the positive/negative fill breakdowns were essentially even (and well under 5% of all fills).

Similar to the patterns observed in locked and crossed markets, we find that there is a direct relationship between pool usage during times of positive momentum and percentage of suboptimal fills. This means that when favorable momentum existed, the pools where clients received excessive amounts of suboptimal fills also had a disproportionately larger market share.



We interpret this as counterparties were aware these pools were likely to provide traders with opportunities in certain circumstances, and as a result directed orders to them advantageously.

Conclusion

In trading, speed still matters. Much like Rothschild profited from a carrier pigeon bringing news of Napoleon's defeat at Waterloo, trading firms are able to profit from systematic timing advantages that occur in increments as small as milliseconds (and sometimes microseconds).

In the process of conducting this research, we met with pool operators, brokers and HFT firms. What we found most interesting is that certain pool operators acknowledge this slowness, while certain HFT firms claim to monitor pools to identify when these conditions arise. This awareness would explain both the prevalence of suboptimal fills in certain pools and the concentration of these fills in conditions that present greater "latency tax" opportunities.

Running a dark pool requires a great deal of resources to ensure fair and efficient treatment across all clients, and pool operators that do not continually make the required investments in technology will leave themselves at the mercy of firms with superior tools.

Competition will naturally enforce a "minimum height requirement," especially as increased focus on analysis exposes deficiencies in individual venues.

Brokers must show diligence in evaluating the pools that they route to on behalf of their clients, and we would strongly advise working with clients continuously to revise strategy so that performance is not negatively impacted by trading in the least-effective pools.

However, the most significant takeaway is that investors need to regularly analyze their own venue and routing data. These particular results may vary by investor, as various execution firms access pools in different ways and pools continually make changes. The only way to ensure that performance is continually held to an optimum standard is to measure on a consistent basis.

****About TABB Metrics and Clarity***

TABB Metrics™ is the data-driven analytics company created by TABB Group, the independent financial markets research and consulting firm. Clarity, developed by TABB Metrics, is a venue and routing analytics service designed to help institutional investors, money managers and plan sponsors work more closely with their execution partners by proactively analyzing their own trading data; measure their execution quality; and work more closely with their execution partners to mitigate the probability of being systematically disadvantaged.