Clearpool Review

TICK SIZE PILOT: YEAR IN REVIEW

On October 31, 2016 the Securities Exchange Commission (SEC) rolled out its implementation of the Tick Size Pilot (TSP). The pilot was designed to evaluate whether or not widening the tick size for 1,200 small cap securities would positively impact trading, liquidity and market quality of those securities.

The pilot's **methodology** applies distinct conditions to three test groups of 400 securities each to compare against the remaining 1,200 securities in the Control Group.

Control Group – There is no change in the way securities are quoted or traded, or the way orders are accepted.

Test Group 1 (G1) – Securities are quoted in $0.05 increments, but they will continue to trade at current price increments, including penny increments at or within the spread. Most brokers and trading centers will only accept limit orders priced in $0.05 increments, while trading centers will cross, execute or fill orders at any price.

Test Group 2 (G2) – Securities are quoted and traded in $0.05 increments. Most brokers and trading centers will only accept limit orders priced in $0.05 increments while trading centers will only cross, execute or fill orders in $0.05 increments. Exemptions will be allowed for midpoint, benchmark contingent and retail trades.

Test Group 3 (G3) – Securities are subject to the same requirements as Test Group 2, however, orders are subject to a "trade-at" requirement, meaning hidden orders cannot trade at the bid or offer without first fulfilling the displayed liquidity at the same price and size in all lit venues. There is an exemption for block orders equal to or greater than 5,000 shares or $100,000 notional.

A look back

Like most industry assessments, our initial analysis of the TSP found a shift in liquidity from off-exchange venues to exchanges in G3 and a shift from maker/taker to inverted exchanges across all test groups. Other studies also found that impact costs increased as the spreads widened, but we did not observe the same result.

Clearpool's algorithms dynamically accessed liquidity at the most opportune times, thereby mitigating the increased impact cost observed by others. Because our algorithms leverage both passive liquidity and low-impact liquidity removal tactics, we observed a decrease in high-impact liquidity removal versus the Control Group. Our ability to dynamically adapt to passively source liquidity and cross the spread in a manner that reduced overall impact helped us achieve improved impact costs.

In our initial observation, we concluded that the pilot may be showing signs of improved liquidity capture for institutional investors. At that time, we committed to measure and report the results of the pilot in the future.

Our assessment

After a year of collecting and analyzing data, it is our assessment that the pilot has not completely achieved its overall intended objective. That said, it has highlighted some interesting dynamics that affect market microstructure.
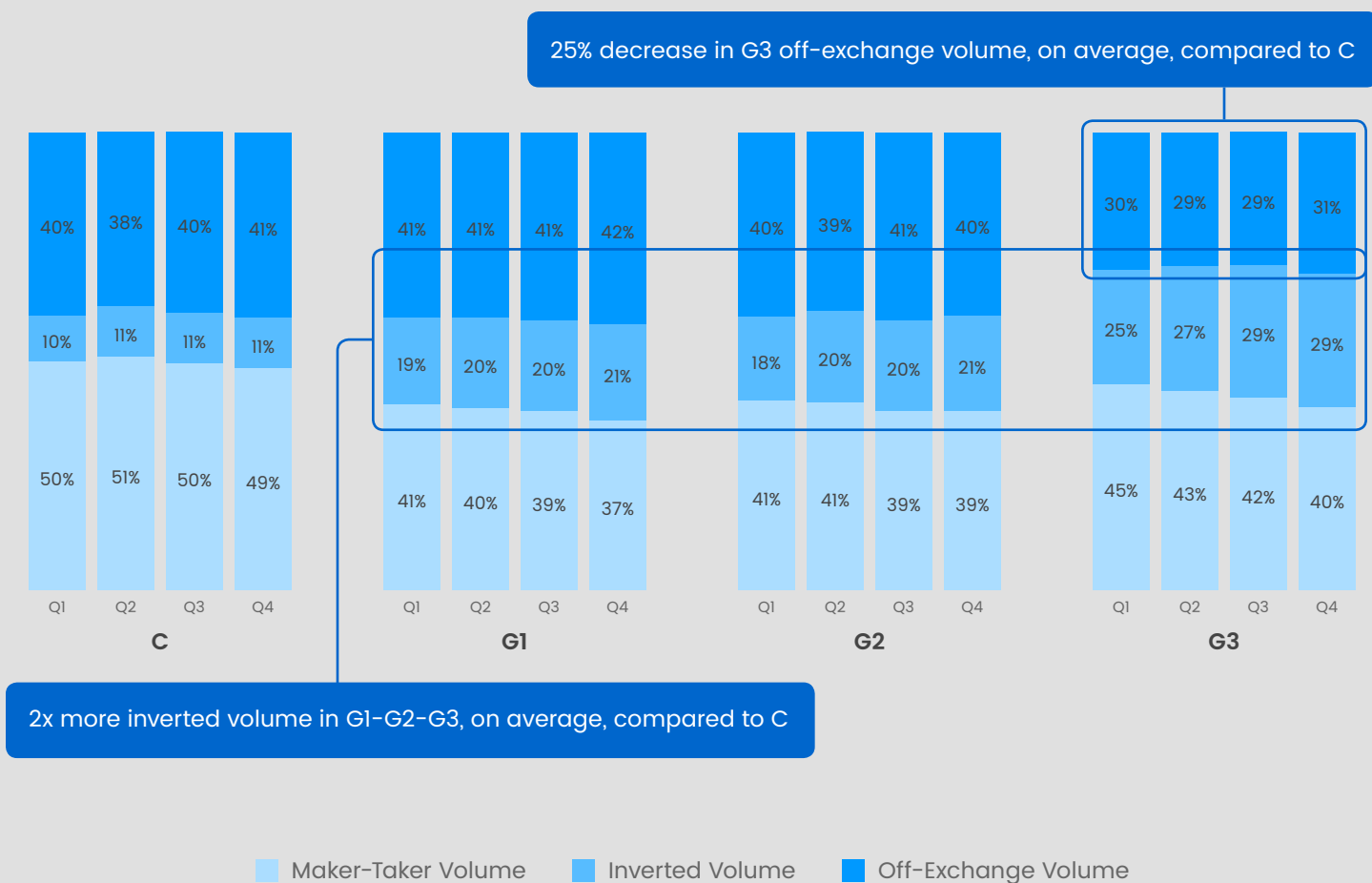
Year in review: Volume

One objective of the pilot is to encourage more trading of small cap stocks on the exchanges, essentially displacing that flow from dark venues. It is our observation that the pilot has been successful in transferring flow from maker/taker to inverted exchanges, as competition in maker/taker exchanges increased.

Volume shift

Although one goal of the pilot was to move trading from dark venues to exchanges, G3 was the only group where we consistently observed a decrease in off-exchange liquidity, which we attribute to the trade-at requirement. Starting in Q2, we observed a shift in flow from off-exchange venues to the inverted exchanges (Nasdaq BX, Cboe BYX, IEX, Cboe EDGA, NYSE American). We believe that this is an effect of the adjustments that were made to manually-adapted algorithms after brokers had the opportunity to assess their initial findings.

25% decrease in G3 off-exchange volume, on average, compared to C

	C				G1				G2				G3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Off-Exchange Volume	40%	38%	40%	41%	41%	41%	41%	42%	40%	39%	41%	40%	30%	29%	29%	31%
Inverted Volume	10%	11%	11%	11%	19%	20%	20%	21%	18%	20%	20%	21%	25%	27%	29%	29%
Maker-Taker Volume	50%	51%	50%	49%	41%	40%	39%	37%	41%	41%	39%	39%	45%	43%	42%	40%

2x more inverted volume in G1-G2-G3, on average, compared to C

Legend: Maker-Taker Volume · Inverted Volume · Off-Exchange Volume
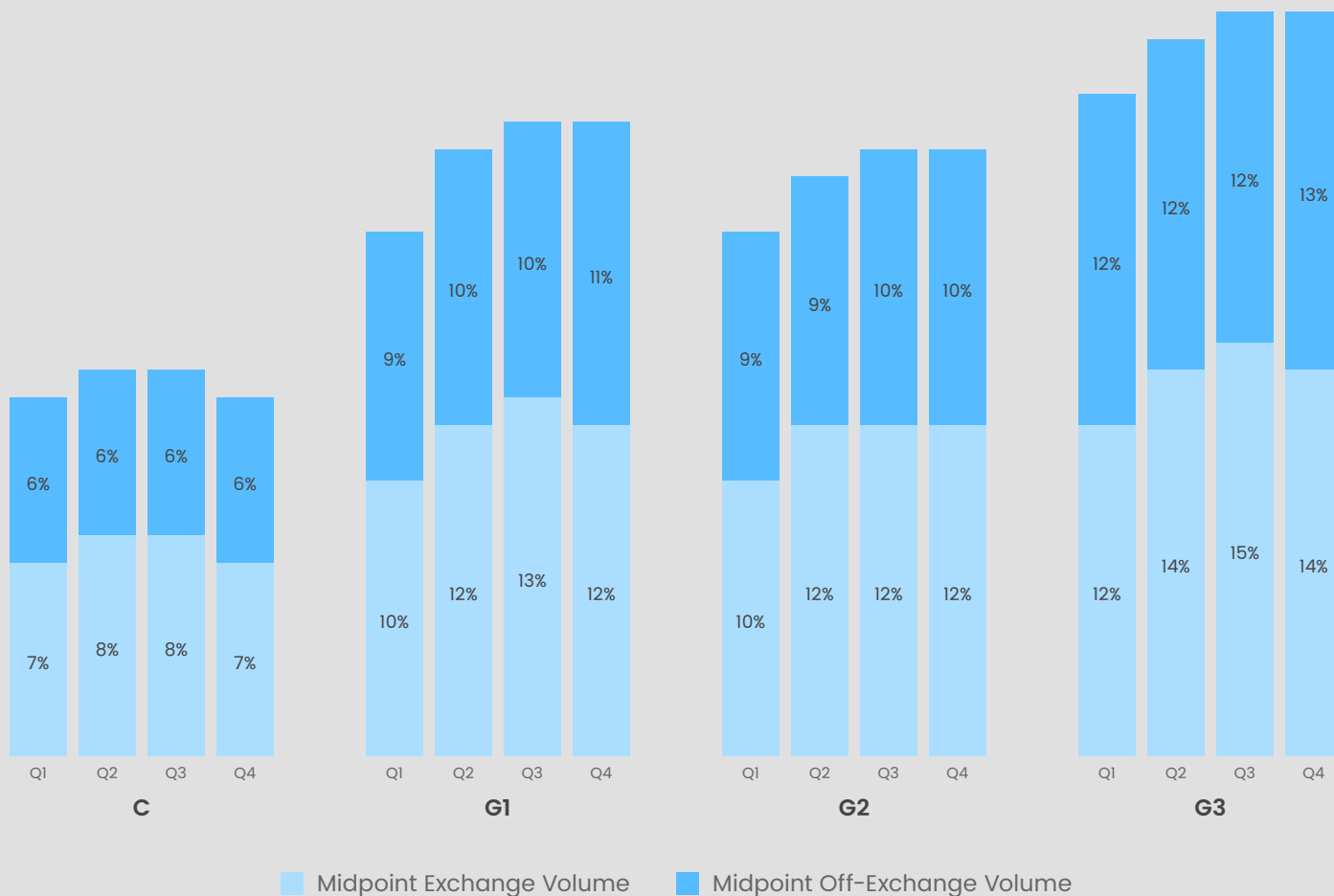
More midpoint liquidity on exchanges

Midpoint liquidity increased for all groups compared to the Control Group. Specifically, as liquidity shifted to the exchanges and pooled around fewer ticks, there were more opportunities to access midpoint liquidity on both maker/taker and inverted exchanges. In G3, where there is an exemption for blocks, we also observed increased midpoint volume off-exchange compared to G1, G2 and the Control Group.

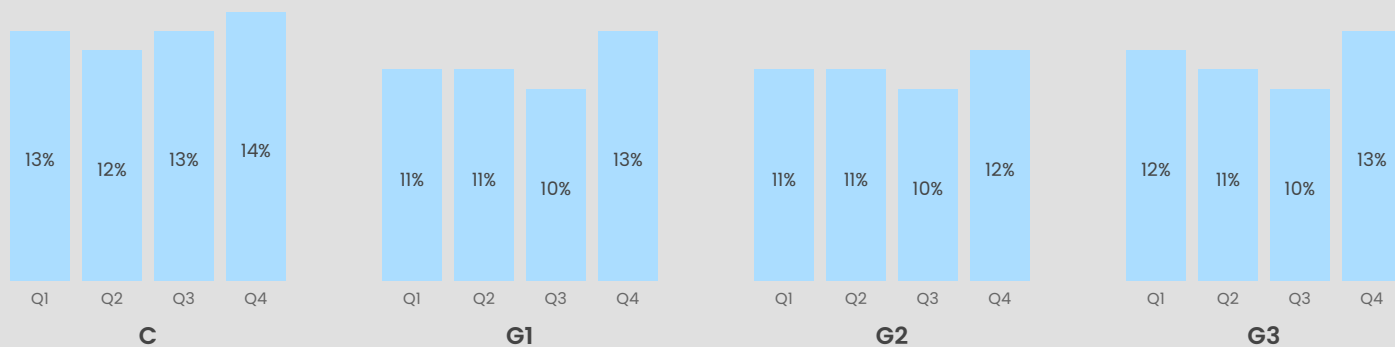Midpoint exchange and off-exchange volume increased in G1-G2-G3

C — Q1: 7%/6%, Q2: 8%/6%, Q3: 8%/6%, Q4: 7%/6%

G1 — Q1: 10%/9%, Q2: 12%/10%, Q3: 13%/10%, Q4: 12%/11%

G2 — Q1: 10%/9%, Q2: 12%/9%, Q3: 12%/10%, Q4: 12%/10%

G3 — Q1: 12%/12%, Q2: 14%/12%, Q3: 15%/12%, Q4: 14%/13%

Legend: Midpoint Exchange Volume | Midpoint Off-Exchange Volume
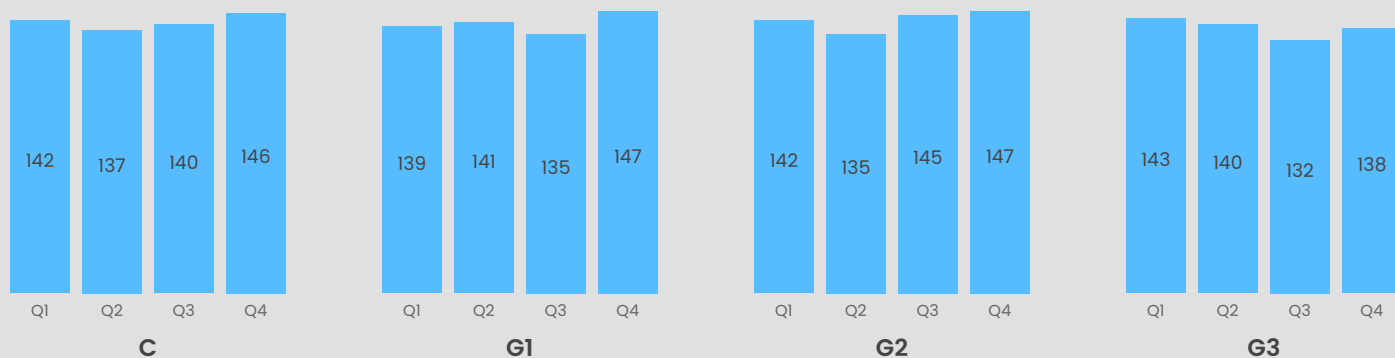
Block liquidity and average trade size remain steady

The pilot defines block liquidity as equal to or greater than 5,000 shares or $100,000 notional.

We did not observe any significant increase in block volume relative to the Test Groups versus the Control Group. There was also no significant change to average trade size, as liquidity pooled at the larger tick.

No significant change in block volume or average trade size

C
Q1	Q2	Q3	Q4
13%	12%	13%	14%

G1
Q1	Q2	Q3	Q4
11%	11%	10%	13%

G2
Q1	Q2	Q3	Q4
11%	11%	10%	12%

G3
Q1	Q2	Q3	Q4
12%	11%	10%	13%

■ Block Volume

C
Q1	Q2	Q3	Q4
142	137	140	146

G1
Q1	Q2	Q3	Q4
139	141	135	147

G2
Q1	Q2	Q3	Q4
142	135	145	147

G3
Q1	Q2	Q3	Q4
143	140	132	138

■ Average Trade Size

Year in review: Liquidity capture

As competition increased in maker/taker venues and volume shifted to inverted and midpoint venues, algorithms had to respond accordingly to optimize passive trading while balancing increasing costs as a result of the need to remove liquidity. Algorithms that adjusted their routing protocols dynamically based on liquidity conditions had greater opportunity to be more aggressive with minimal impact and to utilize low-impact liquidity removal tactics to source high-quality midpoint liquidity.

Liquidity capture

As passive trading became more competitive and it became more difficult to capture the full spread, Clearpool's algorithms routinely captured more midpoint liquidity in G1, G2 and G3 than the Control Group to help mitigate impact.

Clearpool's algorithms consistently and opportunistically removed liquidity across G1, G2 and G3 compared to the Control Group. Because our algorithms had the freedom to adapt and remove liquidity at the most opportune times, they also reduced high-impact liquidity removal over the observed time period.
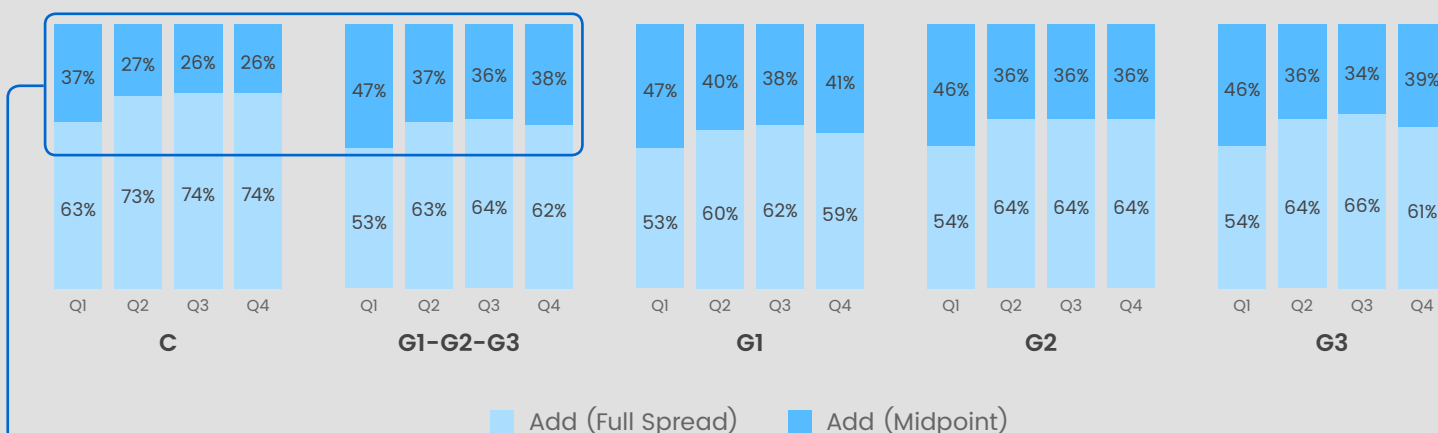
Clearpool algorithms increased midpoint liquidity capture by 35% in G1-G2-G3, on average, compared to C
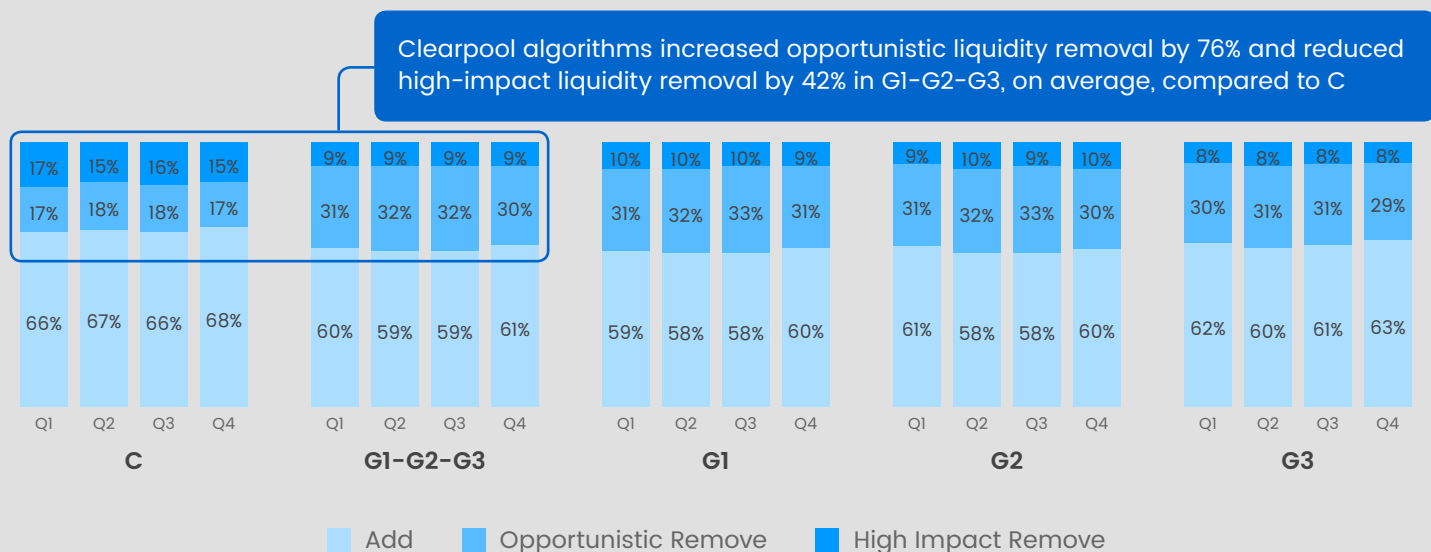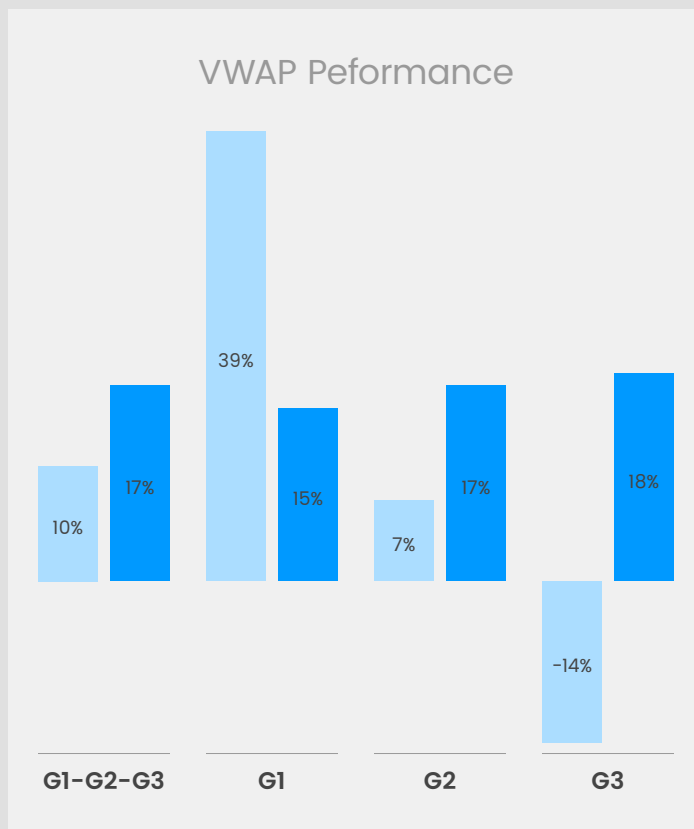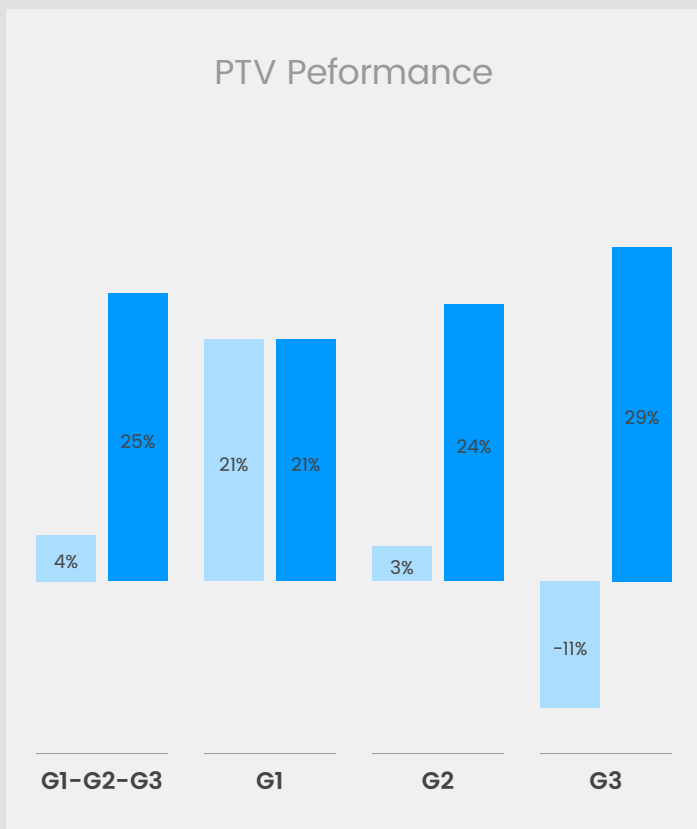
Clearpool algorithms increased opportunistic liquidity removal by 76% and reduced high-impact liquidity removal by 42% in G1-G2-G3, on average, compared to C

Consequently, in this analysis we measured the aggregated performance of our schedule driven algorithms—POV, TWAP and VWAP—because these strategies typically represent large institutional orders. They are grouped together and represented in this analysis as PTV, and VWAP is also represented on its own. Clearpool's algorithms continued to dynamically adapt to market structure, with PTV showing an overall 4% improvement in aggregated G1, G2 and G3 impact costs and a 25% improvement in trading fees, compared to the Control Group. VWAP displayed an overall improvement of 10% in aggregated G1, G2 and G3 impact costs and a 17% improvement in trading fees, compared to the Control Group.

Clearpool algorithms dynamically adapted to maintain or improve overall performance in changing market conditions

PTV Peformance

4%	21%	3%	-11%
25%	21%	24%	29%
G1-G2-G3	G1	G2	G3

VWAP Peformance

10%	39%	7%	-14%
17%	15%	17%	18%
G1-G2-G3	G1	G2	G3

■ Impact Cost Improvement Compared to C   ■ Rebate Improvement Compared to C

One would hypothesize that as passive trading for TSP stocks became more competitive, algorithms would have to find more aggressive ways to source liquidity, and that would result in higher impact costs.

But as the liquidity continued to shift, Clearpool's algorithms maintained some improvements in impact costs and trading fees. One clear observation around impact cost and trading fees was that as the restrictions for each group increased, the less efficient we were at improving costs and fees compared to the Control Group.

Group 1
G1, which quotes in $0.05 ticks but still executes in $0.01 increments, is the least restricted in the pilot. In our observations for this group, PTV and VWAP had the most impact cost improvement and were also able to effectively capture rebates and improve trading fees. However, fewer rebates were captured in G1 compared to G2 and G3.

Group 2
G2 quotes and executes in $0.05 ticks, with exemptions for midpoint, benchmark contingent and retail trades. In both PTV and VWAP, we observed some impact cost improvement in G2 compared to the Control Group, however, there was less improvement in impact cost than we observed in G1. Both PTV and VWAP were more efficient in capturing rebates and improving trading fees in G2 compared to the Control Group.

Group 3
G3, the most restricted, is subject to the same requirements as G2 with an additional trade-at requirement. Orders must be filled in the lit markets first before executing in the dark, with an exemption for blocks. In G3, we did not observe any improvement in impact cost for either PTV or VWAP compared to the Control Group.

Despite the inferior impact costs in G3, we observed the most improvement in trading fees for PTV and VWAP in this group. We believe this is a result of the trade-at requirement. As liquidity moved out of dark and into lit markets (inverted markets specifically), our algorithms effectively took liquidity and captured the rebate.

When measuring performance of PTV and VWAP in G1, which was the least restricted, we can conclude that as passive liquidity became more competitive, our algorithms effectively balanced the shift in volume. While there were fewer opportunities to add liquidity at the full spread, we captured more liquidity at the midpoint compared to the Control Group, and we improved impact costs and trading fees overall.

When sourcing passive liquidity in PTV and VWAP, we also observed that as restrictions increased in G2 and G3 our algorithms were less efficient at capturing midpoint liquidity than in G1. Because our algorithms dynamically adapt to where liquidity exists, once it became less efficient to add liquidity passively, the algorithms adapted and shifted their behavior to opportunistically remove liquidity from inverted venues where the rebate would offset trading fees. In G3, which was the most restricted, our algorithms could not recognize any improvement on impact costs, but were able to opportunistically remove liquidity and improve overall trading fees to balance performance.

Essentially, Clearpool algorithms' dynamic adaptation to market structure changes counterbalanced the microstructure effect on impact costs and trading fees. Therefore, Clearpool recognized overall improved impact costs and trading fees for the pilot.

Chasing the rebate

With an estimated 90% of institutional executions engaging with algorithms and so many algos hard wired to capture the rebate, many algo providers cited a decrease in performance as a result of the widened tick. Prioritizing the rebate over balancing impact costs and trading fees impacted performance in a couple ways. Either one would sit in the queue waiting for the rebate as the market moved away, or participate more frequently in high impact removal to complete the order.

Trade-at impact on performance

As a result of the trade-at requirement, the volume shift to lit markets in G3 had an adverse impact on performance. We observed in G3 that as more volume shifted to inverted venues and there was less liquidity in off-exchange venues, there was more impact on performance compared to G1 and G2. While Clearpool's algorithms dynamically adapted to source liquidity at inverted venues, they could only mitigate impact for this group.

Increased depth of book is positive for institutional investors

While the pilot has not been completely successful in improving the trading environment of TSP stocks, there have been signs of improved liquidity for institutional investors who desire to trade small cap stocks. When speed was not the absolute priority, spreads widened as the volume shifted, there was greater depth of book, and liquidity consolidated at fewer price points. These changes in microstructure made it more efficient for institutional investors to capture liquidity. However, the behavior of algorithms used to source that liquidity had to dynamically adapt to where the liquidity existed in order to properly execute against the pooled sources of liquidity at the most opportune times to mitigate impact.

An Implication on Microstructure – The Access Fee Pilot

From the results of the TSP, and based on some algos' configuration to "chase the rebate," clearly there should be some additional thought given to the Access Fee Pilot. There is directional evidence from the results observed in the TSP that there could be bias in brokers' routing protocols that prioritizes rebates.

Our comment letter posted to the SEC website has further detail on our point of view. The comment letter can be found <u>here</u>.

Summary

Clearpool's algorithms are designed to add or remove liquidity at the most opportune times, and we were able to balance performance because of their adaptive behavior. Our algorithms maximize passive liquidity capture then seek to leverage low-impact/opportunistic liquidity removal and high-impact liquidity removal tactics to mitigate impact on performance. We will continue to track our performance in the TSP and look forward to interpreting the observations of other industry participants, including the exchanges and FINRA's upcoming joint assessment.

Questions about TSP or to learn more about Clearpool
Contact sales at sales@clearpoolgroup.com