Tick Size Pilot

Evaluating the Effect of the Pilot Program on Execution Quality

Introduction

On May 6, 2015, the SEC approved the National Market System (NMS) Plan by the National Securities Exchanges and FINRA to implement a Tick Size Pilot Program that would evaluate whether widening the minimum quoting and trading increments – or tick sizes – for stocks of smaller capitalization companies would improve the market quality of these stocks for the benefit of issuers and investors. The NMS Plan specified three Test Groups (see definitions of each group in Appendix) of approximately 400 securities each to be quoted in $0.05 increments, as well as a Control Group that would be quoted and traded as
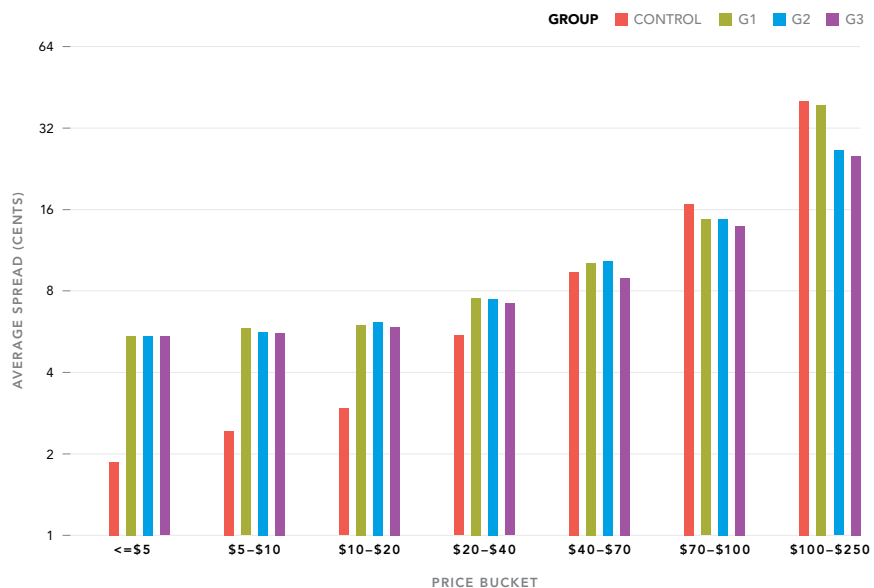
before. The pilot officially commenced on October 3, 2016, and in this note we evaluate market microstructure quality of the stocks included in the pilot based on a proprietary data set of over several hundred thousand parent VWAP orders, uniformly split between Test and Control Group securities and spanning the period from January 1, 2017 to June 15, 2018.

Major Conclusions

- We find that for securities priced under $40, which represent more than 70% of the Test Group, there is a significant degradation in execution quality for the Test Group securities relative to the Control Group.

- We estimate that ordinary investors trading Test Group securities since January, 2017 incurred additional shortfall costs of over $300 million.

FIGURE 1

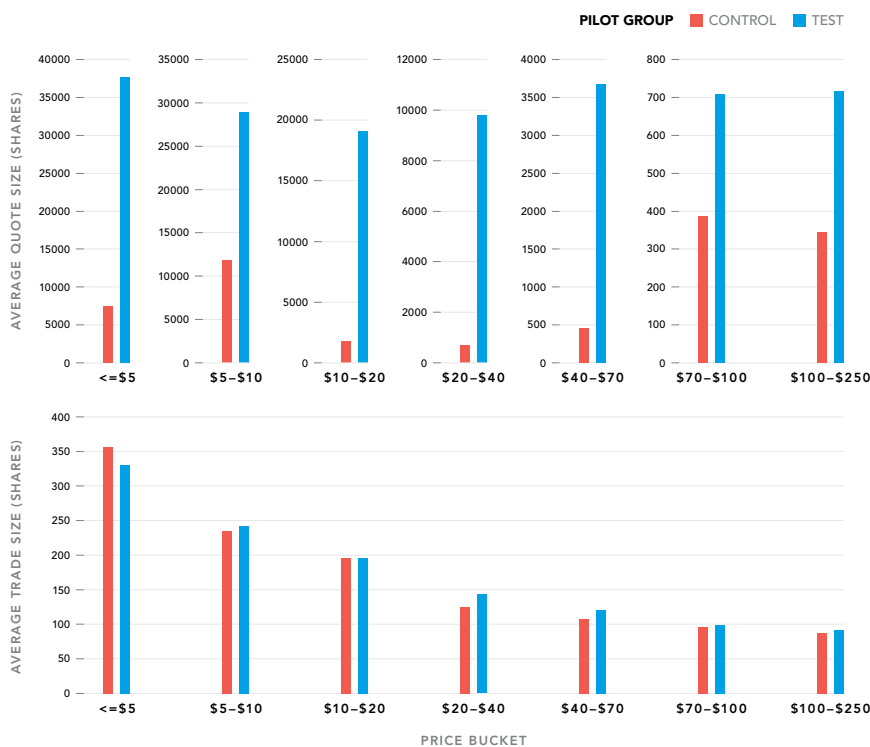Average spread of Pilot Program securities by price

Market Microstructure

Before focusing on execution, we survey the complete universe of Pilot Program securities, including the Control Group, and consider how market microstructure has changed for the stocks assigned to the Test Groups since January 1, 2017. The last three months of 2016 are omitted to allow for the market to transition to a new trading regime for affected securities.

Figure 1 shows the average spread of all Pilot Program securities grouped into seven price buckets. We observe that for lower priced stocks, the average spread for the Test Groups has increased as much as five-fold relative to that of the Control Group, as would be expected. For wider-priced stocks, which traditionally tend to exhibit higher spreads, the differences in spread are not as pronounced and remain largely unchanged compared to pre-Pilot Program values. Overall, the larger tick size artificially forces the spread to be wider than it naturally would be without this constraint.

Figure 2 shows average quote and trade sizes for Test and Control Groups. With spreads artificially widened, we infer that the liquidity that would normally fill in the disallowed penny levels is aggregated at the top of the book, which is reflected in the significant increase we observe in top of the book displayed
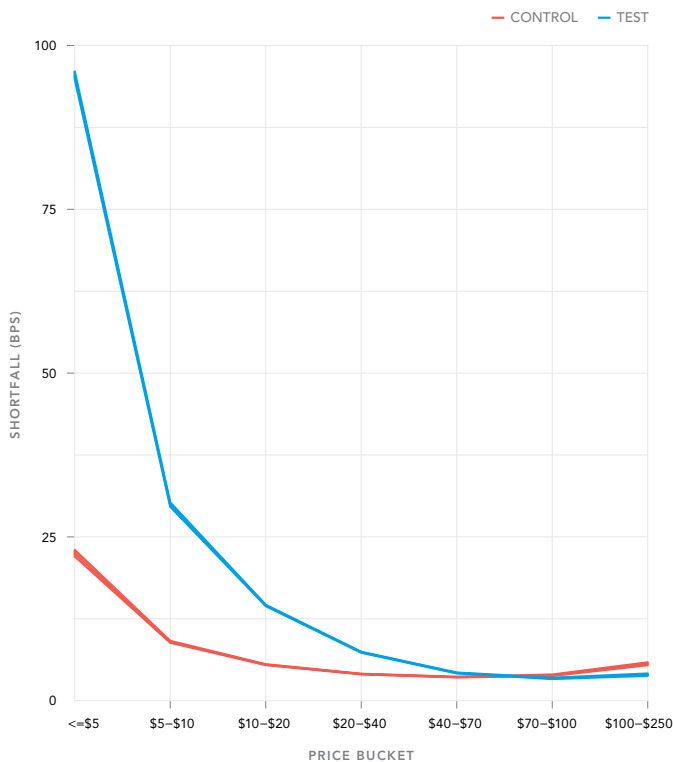
size for lower-priced stocks. In particular for $10-$20 and $20-$40 groups, Test Group securities exhibit over 10 times the average displayed size of the Control Group. At the same time, however, the average trade size is practically unchanged, and since higher daily volumes for Pilot securities have also not materialized, it now takes longer for passive orders to be executed. Consequently, maintaining queue priority becomes more important, and the adverse selection effect is amplified. A useful analogy here is the difficulty in passively trading a stock like Sirius XM (SIRI) where queues are extremely long. As a result, when executing passive orders at the near touch becomes more difficult, we expect execution to shift toward mid-point matching and aggressive orders.

In the following sections, we illustrate these effects of the wider tick size on execution quality by analyzing a sample of our VWAP executions. We chose to look at VWAP orders since it is one of the most heavily used algos and tries to capture spread through passive and mid-point orders. Evaluating performance of a large number of VWAP executions provides a good indication of the effect the Pilot Program might have had on execution quality of the Test Group securities.

We start by illustrating the impact of the longer queues (without a complementary increase in volume) on performance of passive orders, a core measure of execution quality. We then include mid-point orders, which our VWAP algo used more extensively for the Test Group to overcome the difficulty of trading passively, to demonstrate how overall execution quality of

Legend: — CONTROL — TEST

Axis labels: SHORTFALL (BPS) (vertical), PRICE BUCKET (horizontal)

Horizontal axis categories: <=$5, $5–$10, $10–$20, $20–$40, $40–$70, $70–$100, $100–$250

Passive and Mid-Point Orders

Given the increased difficulty in executing passive orders at the near touch due to artificially widened spreads, longer queues and no compensating increase in volume, it is not surprising that a significant number of trades are transacted at the mid for Test Group securities. Our VWAP algo leverages mid-point orders more extensively for Test Group securities to adjust to this noticeable and unintended consequence. In our analysis, we likewise need to take the mid-point orders into account in order to understand the real impact of the Tick Pilot on performance for the test groups.

To evaluate the overall microtrading shortfall of the VWAP strategy, we consider all child orders, posted at the near-touch, resting at the mid-point, and crossing the spread. The VWAP algo can decide to rebalance quantity from one venue to another to better inter-cept mid-point liquidity. We measure the microtrading shortfall by comparing each execution, from pas-sive, mid-point or aggressive orders, relative to the mid-point price at the time the algo first intended to execute that amount rather than relative to the prices at the time of entry of that particular order.[1]

As before, we aggregate the shortfall in each Pilot Program group and price bucket and plot the mean value-weighted shortfall in Figure 4. Shaded areas represent the 95% confidence intervals of each group.

Taking mid-point executions into account, we see a marked improvement in the effective microtrading shortfall for Test Group securities. However, there is still a significant degradation in execution quality for Test Group securities over that of the Control Group. For the two price buckets of $10-$20 and $20-$40, which contain roughly half of all the executions, the additional shortfall is on average 6.1 and 1.95 basis points, respectively.

Test Group securities is affected by the Pilot Program. Our data set consists of all the child orders from VWAP orders handled by Pragma on behalf of our clients from January 2017 through June 2018 in Tick Size Pilot securities. The data set is approximately equally split between securities from Control and Test Groups.

Passive Near-Touch Orders

We first focus on purely passive orders and examine the average execution quality of more than 4 million near-touch child orders sent by the VWAP algo. The shortfall of each filled child order is defined as the buy-normalized difference, expressed in basis points, between the fill price and market mid-price at the time the child order was originally submitted to the market. For unfilled passive orders, we use the far-touch price at time of cancellation to account for opportunity cost. We aggregate the shortfall in price buckets and plot the mean value-weighted shortfall in Figure 3.

For Test Group securities priced under $40, we observe a significant degradation in passive near-touch child order performance over that of the Control Group. For higher-priced stocks, the changes are not significant since the effective spread of those securities was not generally affected by the Pilot Program (see Figure 1).

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1   Consider the case when a VWAP algo wants to execute the next 100 shares, and sends an order to venue A. After some time, the algo cancels the order to A, and sends the quantity to venue B. Suppose the order at venue B gets a partial fill. After a while, the unexecuted quantity at venue B will be cancelled to clean up the quantity in a sweep to venue C. The executions from both orders to venues B and C are compared to the mid-point price at the time the algo first wanted to execute that amount, when the order was sent to venue A.
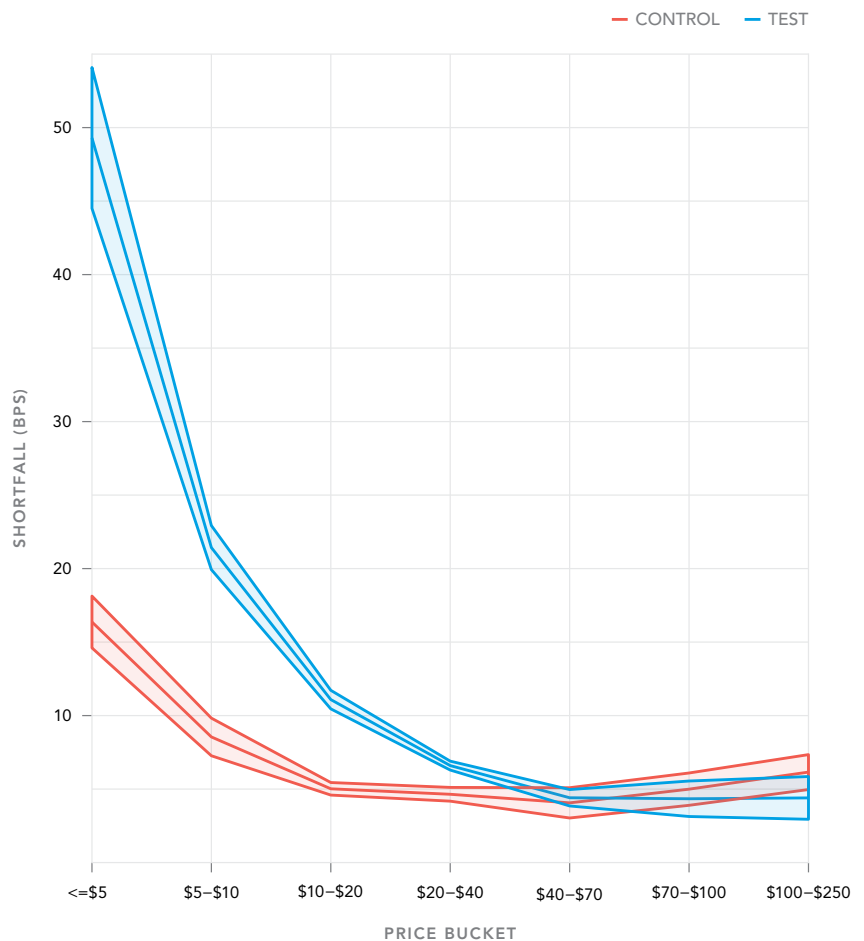
Conclusion

Since the Tick Size Pilot Program went into effect, market quality has significantly degraded for the Test Group securities in the ways critics of the pilot predicted prior to its initiation, and resulted in significant additional trading costs incurred by our clients, who represent pension funds, mutual funds, and other long-term investors.

The bid-ask spread grew by an average of 31% in the Test Group nickel-spread stocks versus the control. Bid-ask spread is a key market quality metric, but one of the theories at the start of the pilot was that a deeper quote might more than compensate for the wider spread. Average quote size grew by a factor of 10, but the average trade size was essentially unchanged, suggesting that the market did not see any benefit in the opportunity to trade in larger size to compensate for the wider bid-ask spread.

Looking directly at shortfall from our client orders at the child order level, we found the Test Group nickel-spread stocks shortfall increased by 64%

on average for passive orders and 38% on average blended across all order types (passive, mid-point, and aggressive).

Extrapolating the total value of Test Group securities traded in the market and assuming that roughly half the volume is generated by directional traders, we estimate that for the two largest price buckets of $10-$20 and $20-$40 priced stocks, the additional costs to be $137M and $76M respectively for the period from January 1, 2017, to June 15, 2018. For all Test Group securities, we estimate the additional cost to be over $300M across this 18 month period. By the time the study is supposed to end in October of this year, the cost to investors could exceed $350 million. The beneficiaries of increased trading costs for directional traders as a group must, by definition, be market makers.

Given our findings that artificially widened spreads lead to a degradation in market quality and execution quality for investors, we strongly recommend that the Tick Size Pilot be unwound at the end of the Pilot period.

Appendix

Test Group One (G1) securities are quoting in $0.05 per share increments but continue to trade at the current price increments, subject to limited exceptions.

Test Group 2 (G2) securities are quoting in $0.05 per share increments like those in G1, but are trading in $0.05 per share increments, subject to certain exceptions, including exceptions that permit executions that are the (1) mid-point between the national or protected best bid and the national or best protected offer, (2) retail investor orders with price improvement of at least $0.005 per share, and (3) negotiated trades.

Test Group 3 (G3) securities are quoting in $0.05 per share increments and trading in $0.05 per share increments consistent with G2. G3 Pilot Securities are also subject to a Trade-at prohibition, which generally prevents price matching by a trading center that is not displaying the best price unless an exception applies. The Trade-at prohibition has exceptions that are similar to those provided in Rule 611 of Regulation NMS.

Control Group securities continue to quote and trade at the current tick size increment of $0.01 per share.
Source: https://www.sec.gov/ticksizepilot