

Via Electronic Submission

Securities and Exchange Commission
100 F Street, NE
Washington, DC 20549-1090
rule-comments@sec.gov

Re: File No. S7-31-22: Proposed Order Competition Rule

Summary

We are co-authors of the study entitled “The Actual Retail Price of Equity Trades” referenced in the Order Competition Rule proposal (Release No. 34-96495, supra note 455).¹ In summary, we placed 85,000 market orders simultaneously at five different brokers using six different accounts, which allowed us to directly compare trading costs across brokers and market centers. Thus, our comments reflect the interests of retail investors, informed by our academic background and trading experience.

The current market structure in the U.S. provides market access to retail traders that is arguably the best in the world. The SEC deserves credit for creating this environment. We do appreciate the SEC’s continued efforts to improve transparency through disclosure, to minimize potential conflicts of interest, and to lower costs and improve access for retail traders. For example, we strongly support the Disclosure of Order Execution Information proposal (Release No. 34-36493).

This “Order Competition Rule” proposal aims at lowering execution costs further by increasing competition among market-makers for retail trades through a new order-by-order auction system. Based on our own trading experience, we have several comments regarding the economic justification for this rule. Our comments can be summarized as follows:

- The SEC provides a detailed empirical analysis of the factors affecting price execution. It reports a statistically significant negative relationship between execution and Payment for Order Flow (PFOF). Using the SEC’s analysis, however, we demonstrate that PFOF has almost no economically meaningful impact on execution. If the proposal assumes that reductions in PFOF will improve order execution, these results suggest that the benefits would be mild.
- The SEC estimates that this proposal would lower execution costs by \$1.5 billion annually. It acknowledges that the proposed auction system could lead to the disappearance of PFOF but minimizes this concern. Based on our trading experience, however, we show that even a minimal increase in commissions could offset the estimated benefit.
- Our trading experience suggests that the proposed order-by-order auction system is potentially unnecessary. Brokers already enforce some competition among wholesalers. Instead, greater competition could be achieved by encouraging new entrants in the existing wholesaler market for retail trades and more disclosures of execution quality across brokers.

Overall, our concern is that the proposed rule could ultimately lead to more costly trades for retail traders, especially those individuals from lower socio-economic groups that have benefited greatly from the current market structure through increased market access.

¹ Our paper is available here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4189239

Impact of Payment for Order Flow on Execution

In Section VII.B.5 of the Proposal, the SEC examines the effect of PFOF on price execution and concludes that “wholesalers provide worse execution quality to brokers that receive more PFOF.” This leads to the argument that the “lack of additional price improvement” ... “results in a lack of order-by-order competition.”

The SEC draws its conclusions from Table 15, which displays regressions of price improvement measures for about 13 million observations across 58 brokers against a number of variables, including PFOF. Price improvement can be measured by the fraction E/Q of effective over quoted spread, where the latter is derived from the National Best Buy and Offer (NBBO) quotes, or equivalently price improvement as a fraction of the quoted spread. For instance, the table shows estimates of a regression of E/Q on several variables, including the PFOF rate, for which the coefficient is 0.0132.² This variable is indeed positive, suggesting that higher PFOF is associated with wider execution spreads, or worse execution. It is described as “statistically significant” at the 1% level, with a t-statistic of 2.82.³

The SEC analysis, however, fails to consider the economic significance of this number, which is more relevant to an economic cost/benefit analysis. We demonstrate that, according to the SEC’s own analysis, the economic impact of PFOF on execution is minimal.⁴ As a result, this weakens the support for the argument in Section VII.B.5.

To assess the magnitude of the effect, consider first the PFOF rate variable used in the table. This is defined as “the retail brokers’ PFOF rate in bps,” which is calculated by dividing the dollar PFOF amounts per share taken from Rule 606 filings by the share price of each trade.

Using the data in SEC’s Table 6, the share-weighted average price for non-ETF trades is \$29.72.⁵ Table 1 below compares the effect of PFOF for the brokers in our study. Consider for example TD Ameritrade (TD) with PFOF of \$0.001 per share. This yields a PFOF rate of 0.337 bps. Multiplying this value by the coefficient of 0.0132 in Table 15 implies that TD’s execution would have a E/Q ratio lower by 0.0044 if its PFOF were set to zero instead.

TD’s E/Q ratio in our sample is 0.056, which corresponds to a Price Improvement relative to the quoted spread of $PI = 50\% - 0.056/2 = 47.2\%$. Eliminating PFOF would therefore lead to an E/Q ratio of $0.056 - 0.0044 = 0.052$, or $PI = 47.4\%$. The increase in PI is therefore 0.2%.

² We use E/Q price execution measures to be consistent with the statistics presented in our paper. This variable controls for the large variation in quoted spreads.

³ However, the very large number of observations in the analysis (more than 13 million) makes it more likely that standard errors are understated. The residuals cannot be independent across this very large pooled cross-sectional time series. The table does use standard errors clustered by stocks but ignores additional correlations induced within brokers or within the broker-wholesaler pair, which likely overstate t-statistics.

⁴ This also supports the conclusion in our own paper that the “variation in PFOF cannot explain the large variation in execution.”

⁵ We exclude ETFs as we did not include them in our experiment. Even with ETFs, the average price is close, at \$34, so this would not change our conclusions.

**Table 1. Comparison of Execution Costs with and without PFOF
(Extending the SEC’s Analysis in Table 15)**

	PFOF	Price Improvement % of Spread (Higher is Better)		Effective/Quoted Spread E/Q (Lower is Better)	
	(\$/share)	Original	No PFOF	Original	No PFOF
TD Ameritrade	\$0.00100	47.2%	47.4%	0.056	0.052
E*TRADE	\$0.00199	36.1%	36.5%	0.278	0.269
Fidelity	None	35.8%	35.8%	0.284	0.284
Schwab	\$0.00100	35.5%	35.7%	0.290	0.286
Robinhood	\$0.00217	26.8%	27.3%	0.464	0.455
IBKR Lite	N/A	19.5%		0.610	
IBKR Pro	None	18.8%	18.8%	0.624	0.624

Source: Authors’ paper for original PFOF and PI % of Spread. Schwab was added in later experiments. Authors’ calculations using estimated coefficient in SEC’s Table 15 as described in the text.

Next, we want to convert this number into a percentage of share value across all trades. So, first, we compute the average quoted spread for wholesaler trades. From the SEC’s Table 6, this is twice the effective half-spread divided by E/Q, or $2 \times 2.05 \text{ bps} / 0.42$, which results in a quoted spread of 9.76 bps.

Using the SEC’s Table 2, we compute a weighted average PFOF amount of \$0.00129.⁶ This number, however, only applies to brokers receiving PFOF. Indeed, the SEC notes “... that about 80% of the share volume ... that were routed to wholesalers and executed comes from PFOF brokers.” Hence, across all brokers, the amount of PFOF for all orders is \$0.00103 per share.

Next, using again the average share price of \$29.72 gives an average PFOF rate of 0.347 bps. Multiplying this value by the coefficient of 0.0132 in SEC’s Table 15 implies that on average all orders would have a 0.0046 lower E/Q, or 0.23% increase in PI. Thus, multiplying 9.76 by the PI increase of 0.23% gives 0.0224 bps of potential savings in execution costs.

Finally, this allows us to assess the overall economic magnitude of the PFOF effect. The wholesaler trading volume is \$13.1 trillion, annualized.⁷ Applying the PI increase of 0.0224 bps gives a total dollar savings from eliminating PFOF of \$29 million per year.

For this market, this is a very small amount. For comparison, using the effective spread, transaction costs on that same volume add up to \$2,690 million per year. Hence, the SEC’s own empirical evidence suggests that the elimination of PFOF is unlikely to lead to meaningful economic improvements in execution for retail traders for NMS equity trades. If the proposal assumes that reductions in PFOF will improve order execution, these results suggest that the benefits would be mild.

⁶ In SEC’s Table 2, the average PFOF amount is reported as \$0.0013 and \$0.00127 for market and marketable limit orders, respectively. Using the share volumes for these orders (72.20 and 34.77 billion, respectively, from SEC’s Table 5), the weighted average is \$0.00129.

⁷ From SEC’s Table 6, the wholesaler volume is \$3,280 billion for 1Q 2022, or \$13.1 trillion per year.

Total Trading Costs

The SEC provides a thorough analysis of the costs and benefits of the proposed order competition rule. It recognizes, however, that “the implementation of qualified auctions [...] could lead to a significant decline or perhaps disappearance of PFOF in the markets for NMS stocks.” It also states that it is “unable to quantify the risk that some discount brokers would resume charging commissions.”

From the viewpoint of retail investors, what matters are total trading costs, which include both commissions and execution costs. The issue is whether the estimated \$1.5 billion annual lower execution cost benefit could be offset by other retail costs, including a return to the commission business model.

This can be illustrated using our trading experiment, which is described in Table 2. Most of these trades were placed at brokers that now have zero commissions. Only IBKR Pro has commissions of \$0.0035 per share with a \$0.35 per trade minimum. The table lists the number of trades per broker, the execution cost relative to midpoint pricing, and total commissions.

Table 2. Total Trading Costs for Our Study

		2022 Total Costs		2018 Costs
	# of Trades	Total Execution Costs	Actual Commissions	Estimated Commissions Only
TD Ameritrade	29,434	\$1,565	\$0.0000/share	\$6.95/trade
E*TRADE	13,663	\$1,479	\$0.0000/share	\$4.95/trade
Fidelity	1,114	\$139	\$0.0000/share	\$4.95/trade
Robinhood	29,487	\$7,640	\$0.0000/share	\$0.00/trade
IBKR Lite	1,100	\$276	\$0.0000/share	\$2.17/trade
IBKR Pro	4,815	\$1,737	\$0.0035/share \$0.35/trade minimum	\$2.17/trade
Total	79,613	\$12,836	\$1,709	\$290,548

Source: Authors’ calculations. IBKR Annual Report for 2018 commissions.

In aggregate, our costs are \$1,709 in commissions and \$12,836 in execution costs for a total of \$14,845. With close to 80,000 trades, our total trading volume was high at \$13.8 million. Even so, the total cost was only 0.108%. This is an example of very low trading costs that reflect competitive and regulatory developments in U.S. equity markets.

To give historical context to these costs, the last column displays commissions as of 2018. Our commissions would have been \$290,548 instead of \$1,709, leading to total costs that would have been immensely higher than only three years ago even with all midpoint pricing. Reversing the reduction of commissions, all else equal, would clearly be harmful to retail investors.

While ultimately it would be beneficial for retail investors to have totally free trading costs (no commission, all midpoint pricing), this is not economically feasible. Brokers and wholesalers must cover their expenses and earn a reasonable return on capital. Evidently, PFOF has allowed brokers to offer zero commissions. Conversely, changes in market structures that decrease or eliminate PFOF will probably force brokers either to return to a commission-based model or to find other ways to increase revenues.

Regarding the latter, we are concerned about the SEC’s suggestion that retail brokers “might be able to [...] develop other lines of business to compensate for the loss of PFOF revenues.” If so, investors would face higher costs for some other activities that are ignored in the PFOF economic cost/benefit analysis and could lead to more opaque fee disclosures or other conflicts of interest for traders.

Regarding a return to commissions, to help quantify the impact, suppose that all brokers reverted to the no-PFOF IBKR Pro commission schedule, which is \$0.0035/share with a minimum of \$0.35 per trade. We note that the former is on the order of magnitude of typical PFOF of \$0.002 per share. The \$0.35 number, however, is a fixed cost per trade and is binding for odd-lot orders (generally below 100 shares.) These are plausible numbers because they presumably support operational costs for accounts without PFOF. Using the transaction volume in the SEC’s Table 7 and assuming that 60% of orders are odd-lots, this leads to a total annual commission cost of \$1.5 billion.^{8,9} In other words, re-introducing even minimal commissions for all retail investors would entirely offset the SEC’s estimated benefit of \$1.5 billion from the proposed rule.

If brokers do return to the commission model, this will likely lead to a reduction in market access, especially for individuals in lower socio-economic groups. Academics have long documented that costs are a barrier to entry for this group (Vissing-Jorgensen, JPE, 2002). Indeed, zero commissions have allowed many first-time traders to enter the market.¹⁰ Even FINRA noted the sharp increase in the number of new retail investors in 2020 and how this created more inclusive market participation.¹¹ From their findings:

“The spike in new investors demonstrates that people, given access and opportunity, will take steps to participate in the equity markets, potentially benefiting from the historically higher long-term returns these markets offer,” said FINRA Foundation President Gerri Walsh. “On the one hand, this research offers the investment industry, investor advocates and policy-makers critical insights about pathways to financial inclusion for all Americans and presents a roadmap to help inexperienced investors, women and people of color close the wealth gap.”

Likewise, it should be noted that fixed commissions per order are relatively more costly for smaller size trades, i.e., for lower income traders. So, even with zero net aggregate effects, re-introducing fixed commissions would create a wealth transfer from low-income to high-income traders.

In summary, retail trading is significantly cheaper today than it was just three years ago. This makes it difficult to suggest that retail traders are already not receiving very low-cost trading. Consequently, it is becoming increasingly more difficult to push execution costs further down. While we applaud such efforts, the SEC should consider carefully whether the new rule will actually increase total costs for investors and any associated wealth transfers between high- and low-income individuals.

⁸ The SEC reports an odd-lot rate of around 63% in its market activity report. This rate has gone up steadily over time.

⁹ From the SEC’s Table 7, the annual transaction volume was \$2.601 trillion for 1Q 2022, or \$10.4 trillion annualized. The table implies an average dollar order size of \$8,000, or an average lot size of 267 with an average price of \$30. We separated orders into an average odd lot (10 shares) and an average round lot (650 shares) so as to match the observed averages. Odd lots were charged \$0.35 per trade and round lots \$0.0035 per share, leading to commissions of \$274 million and \$1,185 million, respectively, for a total of \$1.5 billion.

¹⁰ <https://www.nytimes.com/2020/07/08/technology/robinhood-risky-trading.html>

<https://www.cNBC.com/2021/04/08/a-large-chunk-of-the-retail-investing-crowd-got-their-start-during-the-pandemic-schwab-survey-shows.html>

¹¹ <https://www.finra.org/media-center/newsreleases/2021/new-research-global-pandemic-brings-surge-new-and-experienced-retail>

Competition in the Wholesaler Market

Table 1 also illustrates a remarkable observation, which is the extent of price improvement provided to retail traders under the current market structure. Price improvement (PI) is measured as a fraction of the NBBO spread. As a reference, with no commissions, trading would be totally costless if all trades were to occur at the midpoint, i.e., $PI=50\%$. Even though this is not economically feasible, our retail trades generally received very good execution. The top five brokers provided PI above 25%, with the highest at 47%. This was made feasible by “segmentation” of all orders into retail and institutional, with retail order mostly sent off-exchanges. Wholesalers can afford to give better pricing to retail orders because they are less likely to be informed, i.e., generate less “adverse selection” against market makers.

Even so, the main concern motivating the SEC’s auction proposal is that the wholesaler market is still not sufficiently competitive, based on comparisons of “realized spreads” (RS) across various markets. RS include effective spreads (e.g., buying price minus midpoint at the time of trade) and subtract adverse price impact (i.e., increase in midpoint over one minute after a buy execution). The SEC’s estimates that RS could drop by 1.08 bp, leading to a potential annual gain of \$1.5 billion. The SEC states that:

“The business model of wholesalers relies on their ability to parse the adverse selection risk of individual investors’ orders based on these numerous characteristics and to deliver some price improvement while still generating the potential for high profits for themselves in the form of a high realized spread. The lack of additional price improvement that could otherwise be provided to individual investors stems from the isolation of marketable orders by wholesalers, which results in a lack of order-by-order competition.”

First, we should note that realized spreads represent revenues to wholesalers, not profits. The issue is whether wholesalers earn unreasonably high returns on capital. If so, creating more competition would certainly be helpful.

Second, realized spreads should be viewed as an “imprecise proxy” for measuring market maker revenues, and indirectly competition.¹² We feel it would be useful to consider other means to create competition in the wholesaler market than the proposed auction market based upon our trading experience.

The broker-wholesaler relationship is an essential aspect of competition among market-makers. Brokers can route orders to a variety of wholesalers. Each broker pays the same amount of PFOF to wholesalers that execute its trades; there are no other contract terms. Thus, brokers have no incentive to route orders to any particular wholesaler other than choosing the one providing the best execution quality. In other words, wholesalers are constantly vying against each other for order flow, which should be expected to create competition.

This is evidenced in our trading results. In our paper (Panel B in Table XI), we report the price improvement provided to our trades by different wholesalers for the same broker (i.e., the three brokers with detailed routing data.) Table 3 reports execution statistics across broker-wholesaler pairs.

The table shows that within broker, price execution is economically similar across wholesalers (except for G1X at Robinhood.) This indicates that wholesalers are already competing against each

¹² For instance, the choice of the time window to measure price impact is arbitrary.

other for a broker’s orders. Indeed, brokers provide systematic feedback to wholesalers on how their execution compares to their competitors.

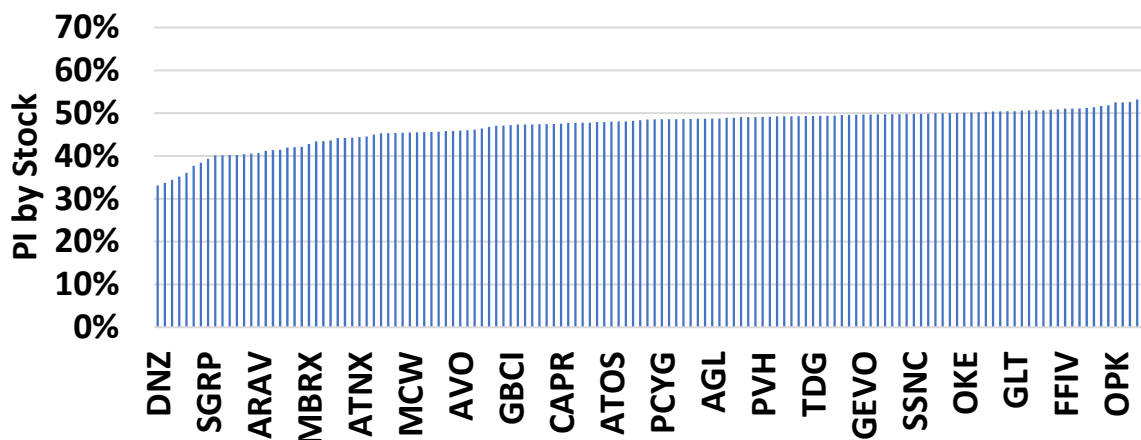
Table 3. Execution Statistics across Brokers and Wholesalers

Venue	Price Improvement as % of Spread Broker:		
	TD	RH	ET
Citadel	49.0%	27.8%	35.6%
G1X	48.0%	14.0%	32.1%
Jane Street	44.0%	25.2%	32.0%
Virtu	47.0%	25.4%	42.9%
Two Sigma	45.5%	21.4%	

Admittedly, it is not clear why price execution varies so widely across brokers. As suggested by the previous SEC statement, pricing should reflect the “adverse selection risk” of retail orders from each broker. So, these differences could reflect further segmentation of retail orders, where brokers have clients with different levels of adverse selection.

The fact that differences in broker execution are related to adverse selection risk is supported by the observation that wholesalers do not differentiate much between individual stock orders from the same broker. Indeed, Figure 1 demonstrates that price improvement for each one of our stocks on average at TD, for example, is within a narrow range. So, what matters most is the characteristic of the broker order flow instead of that of the individual security.

Figure 1. Price Improvement (%Spread) across Stocks at TD

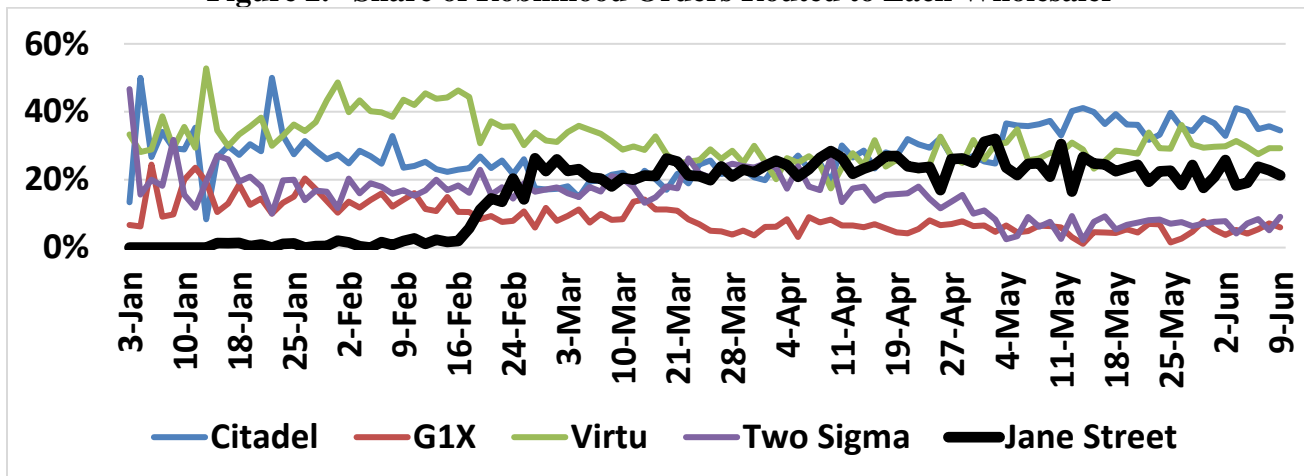


This has implications for the order-by-order auction proposal. Wholesalers currently have the option to vary pricing of orders from the same broker by stock, but choose not to do so, focusing instead on the overall broker order flow characteristics. If this what matters most, then breaking down auctions order-by-order, i.e., by stock, is not necessary.

In our view, other means can be used to ensure greater competition. As indicated, brokers already have the freedom to switch across wholesalers if one offers better pricing. To illustrate this, consider

the example of a new wholesaler, Jane Street, entering the market for Robinhood during our trading period. Figure 2 displays the percentage of our orders that were routed to each wholesaler.

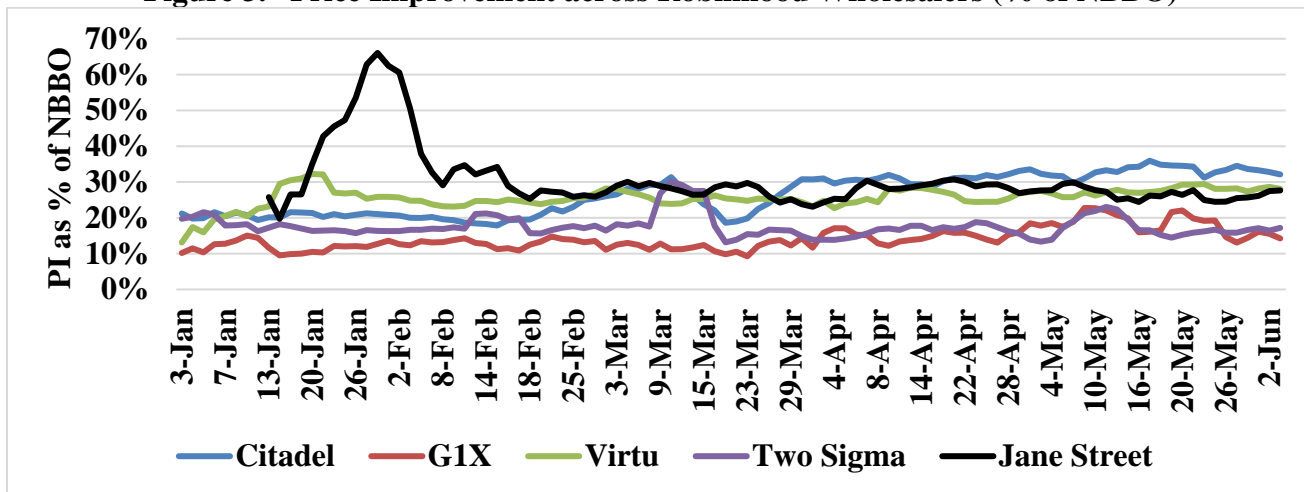
Figure 2. Share of Robinhood Orders Routed to Each Wholesaler



At the beginning of our sample period, none of our orders were routed to Jane Street. By the end of February, however, one-quarter of our orders went to Jane Street. This suggests a competitive market, which allows for new entrants.

So, why did Robinhood start routing orders to Jane Street? Under best execution rules, we would presume that Jane Street was offering better execution than others. Indeed, Figure 3 describes our average price improvement across wholesalers. This confirms that Jane Street’s execution quality was superior to others in January and February as it tried to win business.¹³

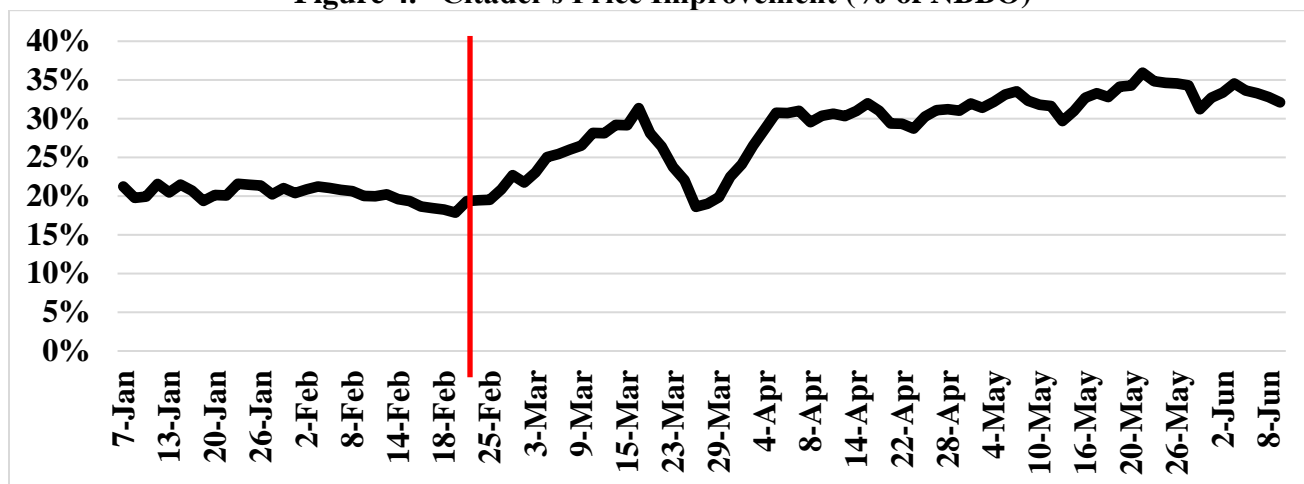
Figure 3. Price Improvement across Robinhood Wholesalers (% of NBBO)



The next question is: What happened to execution for the other wholesalers after this new entrant? Figure 4 highlights the average price improvement for Citadel around the time that Robinhood started ramping up orders to Jane Street.

¹³ We note that Jane Street initially offered price improvement above 50%, i.e., better than the midpoint. It is not economically feasible to offer this consistently, however, and must have happened as an initial effort to win business.

Figure 4. Citadel’s Price Improvement (% of NBBO)



This shows that Citadel reacted to the new entrant by improving its pricing and as a result kept its market share. More generally, Table 4 describes routing and price improvement statistics across wholesalers before and after the new entrant.

Table 4. Execution Statistics across Wholesalers

	Pre-Jane Street		Post-Jane Street	
	% of Orders	PI %	% of Orders	PI %
Virtu	39%	24.3%	29%	26.3%
Citadel	27%	20.3%	27%	29.6%
Two Sigma	18%	16.9%	14%	17.6%
G1X	14%	12.6%	7%	13.6%
NASDAQ	1%	15.2%	1%	13.7%
Jane Street			22%	27.4%

This suggests that the wholesaler market can be subject to external competition. On the other hand (assuming that Citadel’s price improvement is economically sustainable in the long term), this example does support the SEC’s view that there was not enough competition in this market. This brings us back to the issue of whether wholesalers are earning abnormal profits.

Overall, our analysis suggests the proposed complex order-by-order auction system may not be necessary. Price improvement seems primarily driven by broker order flow characteristics, which weakens the argument for creating an auction mechanism for individual stock trade orders. Additionally, brokers already give regular feedback to wholesalers about their execution performance, which creates some form of competition for retail orders.

We suggest that the SEC could rely more on this existing market structure and actively encourage new entrants into the wholesaler market. Indeed, a valuable goal of the proposed auction rule is to expand access to market making for retail trades. Additionally, the concurrent “Proposed Disclosure of Order Execution Information” (S7-29-22) will disclose order execution information by broker-wholesaler pair. If adopted, this should give more leverage to brokers to push for further price improvement.

Conclusions

While we support the SEC's attention to execution quality in the retail trading market, we provide comments on several points regarding the economic justification for the order-by-order auction rule.

First, we document that the SEC's own analysis supports the view that PFOF has almost no economically meaningful impact on execution. If the proposal assumes that reductions in PFOF will improve order execution, these results suggest that the benefits would be mild. Second, we note that the current market structure for retail trading has led to total transactions costs that are already at all-time lows. Any proposed change that might eliminate PFOF should include specific consideration for maintaining zero commissions, which have greatly expanded market access, especially for disadvantaged groups. Finally, we discuss approaches to further improve pricing. Given that price execution seems mainly driven by overall broker order flow characteristics, resorting to order-by-order trade auctions is potentially unnecessary. Instead, we suggest actively encouraging new entrants into the wholesaler market or offering more execution quality disclosure by broker-wholesaler as proposed by the SEC to ensure greater competition.

Sincerely,

Professor Christopher Schwarz, University of California, Irvine
Professor Philippe Jorion, University of California, Irvine