Comment Letter on Behalf of Virtu Financial, Inc.

Re: Order Competition Rule, Release No. 34-96495; File No. S7-31-22 (Dec. 14, 2022)

TABLE OF CONTENTS

March 30, 2023

VIA ELECTRONIC DELIVERY

Ms. Vanessa A. Countryman
Secretary
U.S. Securities and Exchange Commission
100 F Street, N.E.
Washington, DC 20549-1090

RE: Proposed Rule: Order Competition Rule, Release No. 34-96495; File No. S7-31-22 (Dec. 14, 2022)

Dear Ms. Countryman:

Virtu Financial, Inc.[1] ("Virtu") respectfully submits this letter in response to the above-referenced rule proposed by the Securities and Exchange Commission (the "SEC" or "Commission") on December 14, 2022 (the "Proposed Rule").[2]

I. Executive Summary

The Proposed Rule contemplates a public auction system that purportedly will increase transparency and competition for individual investor orders, resulting in execution of those orders at better prices. For institutional investors, the Proposed Rule contemplates new opportunities to interact with an increased volume of individual investor orders currently inaccessible to them.[3] These contemplated benefits and promises are, at best, entirely theoretical and speculative, and the Proposed Rule is likely instead to diminish the substantial benefits that retail investors currently experience as a result of the vigorous competition for retail orders that presently exists today.

As described in detail below, the current market structure yields significant benefits for retail investors, including broadly available commission-free trading, speedy and certain execution of orders, and significant price and size improvement. Indeed, recent publicly available analyses have estimated that today's retail investors receive actual and measurable benefits in excess of $20 billion annually from the existing equity market structure. These benefits are the result of a broad and diverse set of market centers competing against one another, including national securities exchanges, to offer investors the highest quality executions. Both Congress and the Commission

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[1] Virtu is a leading financial firm that leverages cutting-edge technology to deliver liquidity to the global markets and innovative, transparent trading solutions to its clients. Virtu operates as a market maker across numerous exchanges in the U.S. and is a member of all U.S. registered stock exchanges. Virtu's market structure expertise, broad diversification, and execution technology enable it to provide competitive bids and offers in over 25,000 securities, at over 235 venues, in 36 countries worldwide. Virtu broadly supports innovation and enhancements to transparency and fairness that increase liquidity and promote competition to the benefit of all marketplace participants.

[2] Proposed Rule: Order Competition Rule, 88 Fed. Reg. 128 (Jan. 3, 2023) (to be codified at 17 C.F.R. Parts 240 and 242). Citations to the Proposed Rule are to the SEC's Securities Exchange Act Release No. 34-96495; File No. S7-31-22 (Dec. 14, 2022), *available at* https://www.sec.gov/rules/proposed/2022/34-96495.pdf.

[3] *Id.* at 5–6.

have long recognized that competition among trading centers is in the public interest. When it created the national market system in 1975, as codified in the Exchange Act, Congress expressly stated that "[i]t is in the public interest and appropriate for the protection of investors and the maintenance of fair and orderly markets to assure[] fair competition among brokers and dealers, among exchange markets, and between exchange markets and markets other than exchange markets."[4] In accordance with this mandate, the Commission explained when it adopted the final rule promulgating Regulation NMS in 2005 that it sought to avoid "a totally centralized system that loses the benefits of vigorous competition and innovation among individual markets,"[5] and when it then reviewed the equity market structure in 2010, it recognized that mandating consolidation of order flow "would create a monopoly and thereby lose the important benefits of competition among markets."[6]

Far from adding to the extensive benefits that retail investors currently enjoy, the Proposed Rule will jeopardize the over $20 billion in savings currently delivered to retail investors—by, among other things, harming competition among trading centers in contravention of the Exchange Act and the clear intent of Congress in establishing the national market system. More specifically, retail brokers, who have a duty of best execution, constantly assess the execution quality received from wholesalers, exchanges and Alternative Trading Systems ("ATSs"),[7] and reward the market centers that provide the most superior execution quality by routing higher levels of order flow to them. This responsive dynamic creates competition between wholesalers which has a disciplining effect on execution quality and causes wholesalers to provide significant price and size improvement and liquidity across all securities, including by extending their own capital. Under the Proposed Rule, this competitive dynamic will be vitiated and wholesalers will no longer have an incentive to provide these benefits. Given this and other likely harms, it is therefore particularly notable that the Commission has failed to identify a market failure justifying this radical proposal. Although the Commission claims that the Proposed Rule is necessary to promote "order-by-order competition," it fails to establish that customers are not receiving best execution for their orders under the existing regime. Instead the Commission merely hypothesizes how things might be made better. And rather than engaging in a process that would allow it to obtain meaningful stakeholder input, including by disclosing the CAT data underlying its analysis, the Commission

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4 15 U.S.C. § 78k-1(a)(1)(C)(ii).

5 Regulation NMS Final Rule, 70 FR 37496 (June 29, 2005), Securities Exchange Act Release No. 34-51808; File No. S7-10-04 (June 9, 2005), *available at* https://www.sec.gov/rules/final/34-51808.pdf ("Regulation NMS Final 2005 Rule").

6 Concept Release on Equity Market Structure at 11, Release No. 34-61358; File No. S7-02-10 (Jan. 14, 2010) ("2010 Concept Release"), *available at* https://www.sec.gov/rules/concept/2010/34-61358.pdf. *See infra* Section V.B.

7 *See* Proposed Rule, *supra* note 2, at 329 ("In fact, retail brokers regularly re-assess whether their current allocation of trading interest to liquidity providers, including wholesalers, exchanges, and ATSs, is optimal.").

has rushed to market a suite of four rule proposals totaling more than 1,600 pages[8] that carry a substantial risk of harm to the welfare of retail investors, and other market participants.[9]

The Commission's rush to market with the Proposed Rule is best evidenced by the significant flaws in its economic analysis. The Commission is obligated under the Exchange Act, and pursuant to general obligations under the Administrative Procedure Act, to conduct a robust cost-benefit analysis justifying the Proposed Rule; it cannot fail to adequately assess the economic effects by, for example, inconsistently and opportunistically framing the costs and benefits of the rule, failing to adequately quantify certain costs, or neglecting to support its predictive judgments. Yet, that is exactly what the Commission did in the Proposed Rule. As an initial matter, it failed to consider how the Proposed Rule will disrupt the current market structure and, in turn, the benefits retail investors currently enjoy. The Commission also has failed to substantiate its fundamental assumption that liquidity providers would be willing and incentivized to participate in its proposed auctions to begin with. Institutional investors are unlikely to risk information leakage about their trading strategy and potential price impact simply to interact with typically smaller-sized retail orders. The Commission attempts to justify the Proposed Rule primarily on the basis that retail investors could notionally receive an additional $1.5 billion in price improvement. But, even the Commission readily admits there is "substantial uncertainty in the eventual outcome" and "considerable uncertainty in the costs that would arise."[10] Moreover, the Commission's calculation of this figure is methodologically flawed for multiple reasons described below. Finally, the Commission has failed to consider how the Proposed Rule and the three other rules it proposed—each of which entails radical changes to interrelated aspects of the equity market structure—relate to, or would operate with, each other and the anticipated cumulative effects if more than one proposal is adopted. It also has failed to consider how the Proposed Rule would interact with the more than two dozen other rules that the SEC has proposed since Chair Gensler assumed leadership.

In short, the Commission is poised to engage in a risky experiment, without having conducted a proper economic analysis, that would jeopardize substantial benefits the current market structure delivers to investors for a theoretical, and highly speculative $1.5 billion in

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[8] The Commission has simultaneously released three other proposed rules. *See* Proposed Rule: Regulation Best Execution, 88 FR 5440 (Jan. 27, 2023) (to be codified at 17 CFR Parts 240 and 242), Securities Exchange Act Release No. 34-96496; File No. S7-32-22 (Dec. 14, 2022) ("Best Ex Rule Release"), *available at* https://www.sec.gov/rules/proposed/2022/34-96496.pdf; Proposed Rule: Regulation NMS: Minimum Pricing Increments, Access Fees, and Transparency of Better Priced Orders, 87 FR 80266 (Dec. 29, 2022) (to be codified at 17 C.F.R. Part 242), Securities Exchange Act Release No. 34-96494; File No. S7-30-22 (Dec. 14, 2022) ("Tick Size Rule Release"), *available at* https://www.sec.gov/rules/proposed/2022/34-96494.pdf; Proposed Rule: Disclosure of Order Execution Information, 88 FR 3786 (Jan. 20, 2023) (to be codified at 17 C.F.R. Part 242), Securities Exchange Act Release No. 34-96493; File No. S7-29-22 (Dec. 14, 2022) ("605 Rule Release"), *available at* https://www.sec.gov/rules/proposed/2022/34-96493.pdf. Citations throughout are to SEC's proposed rule releases.

[9] Furthermore, before formulating the Proposed Rule, the Commission could have, but did not, conduct a Pilot Program to test one or more of the extensive changes it now proposes and to gather critical data before introducing significant potential risk to the market and investors.

[10] Proposed Rule, *supra* note 2, at 181, 183.

notional savings that the Proposed Rule hypothesizes may accrue from an order-by-order auction regime.

Indeed, experts and market participants alike have raised serious concerns with the Commission's analysis. Attached to this letter, and incorporated by reference, is the Report of Professor Craig Lewis, the Madison S. Wigginton Professor of Finance and Professor of Law at Vanderbilt University. From June 2011 to May 2014, Professor Lewis served as Chief Economist and Director of the Division of Economic and Risk Analysis at the U.S. Securities and Exchange Commission. Professor Lewis has identified significant deficiencies in the Commission's economic analysis and raises serious doubts as to crucial assumptions underlying the Proposed Rule and the other three rules proposed simultaneously by the Commission.

Virtu has separately submitted a joint statement with Cboe Global Markets, State Street Global Advisors, T. Rowe Price, and UBS Securities LLC, presenting a consensus position that urges the Commission to withdraw its expansive auction proposal and instead consider an iterative approach to enhancing retail investor execution quality.[11] Given the common objective in each of the proposed rules[12] – to enhance execution quality for investors – we firmly believe this goal can best be achieved by updating and enhancing Rule 605, as it is arguably the most impactful and least disruptive of the proposed rules. We therefore recommend that the Commission first amend Rule 605 to provide more comprehensive execution quality statistics based on input from investors and market participants, and then pause to study and assess market quality based on the newly collected data before determining whether to move forward with the other proposals. Following the adoption and implementation of enhancements to Rule 605, we suggest the Commission conduct a study to reassess the need for potential reductions in quoting increments, as supported by data, to a half penny for stocks that meet a multi-factor definition of tick constrained.

Virtu is also highly aligned with the joint letter submitted by the NYSE, Charles Schwab, and Citadel Securities, expressing similar concerns about the simultaneous implementation of four potentially far-reaching proposals.[13] They too have urged the Commission to consider a more targeted and phased approach, similar to the suggestions described above, that would reduce risk of serious adverse consequences and allow the Commission to study the resultant impact on the market before proposing further changes. That these major institutions – all occupying distinct yet interrelated roles in our national securities market system – collectively reject the

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[11] Joint Letter of Cboe Global Markets, State Street Global Advisors, T. Rowe Price, UBS Securities LLC, and Virtu (Mar. 24, 2023), *available at* https://www.sec.gov/comments/s7-32-22/s73222-20161714-330556.pdf.

[12] *See, e.g.*, Tick Size Rule Release, *supra* note 8, at 126 (proposing acceleration of implementation of round and odd-lot definitions so market participants can benefit from "increased transparency and enhanced execution quality"); 605 Rule Release, *supra* note 8, at 279 (stating that improving usability of Rule 605 reports "would lead to increased competition between reporting entities on the basis of execution quality, leading to improvements in the execution quality received by investors"); Proposed Rule, *supra* note 2, at 256 & n.499 (noting proposal will "increase competition" and "is predicted to improve execution quality"; also relying on measures of execution quality to justify rule throughout proposal); *see also* Best Ex Rule Release, *supra* note 8, at 15 (noting best execution obligations are premised on improving executions for customer orders).

[13] Joint Letter of NYSE, Charles Schwab, and Citadel Securities to the Commission (Mar. 6, 2023), *available at* https://www.ice.com/publicdocs/nyse/Joint_Consensus_Position_Letter_to_the_SEC.pdf.

Commission's approach to the proposed rules in general, and the Proposed Rule in particular, strongly suggests that the Commission's process and analysis is fundamentally flawed.

- **The Proposed Rule's Untested Auction Regime Threatens Over $20 Billion in Annual Savings That Currently Inure to Retail Investors**

Contrary to the narrative advanced in the Proposed Rule, retail investors enjoy significant benefits under the current market structure—benefits that will be jeopardized by the Proposed Rule. As explained in detail in Section I and in Professor Lewis's Report, retail brokers, which are subject to a duty of best execution, allocate more or less order flow to wholesalers based on the level of execution quality provided by those wholesalers. Wholesalers' revenue is dependent on the amount of order flow they receive. They are therefore incentivized to provide the greatest execution quality possible to each and every order to ensure they are allocated more order flow than their competitors. This competitive dynamic and commercial accountability to retail brokers, in addition to their own duty of best execution, forces wholesalers to provide significant price improvement and size improvement on orders, as well as guaranteed execution, including the execution of illiquid stocks. As SIFMA has explained, "The competition for order flow is a hunger game, driven by execution quality. As retail brokers route their order flow based on execution quality metrics, the competition is centered around this one concept: who will perform better (i.e. provide best ex) for my clients' order flow? Executing firms need to prove their worth day in and day out."[14] This intense competition, among other factors, has led to a persistent narrowing of bid-ask spreads over the last few decades, resulting in better pricing for investors.[15] In addition, data shows that retail investors enjoy **over $20 billion in annual savings**:

> **Price Improvement:** According to Rule 605 reports for 2020, wholesalers provided over **$3.6 billion** in price improvement to retail investors.[16] While this is impressive, Rule 605 reports do not represent a complete view of the execution quality benefits that retail investors receive today, and this amount is likely an underestimate of the price improvement delivered to retail investors.[17]
>
> **Size Improvement:** Based on our analysis of publicly available data, and as supported by an analysis conducted by Schwab – as well as independent studies by Notre Dame's Robert Battalio and Indiana University's Robert Jennings discussed in Section II.B below– size improvement adds roughly 2X the benefit of Rule 605 reported price improvement on an

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[14] SIFMA Insights, *US Equity Market Structure Analysis: Analyzing the Meaning Behind the Level of Off-Exchange Trading Part II* at 5 (Dec. 2021) ("SIFMA Insights Report"), https://www.sifma.org/wp-content/uploads/2021/12/SIFMA-Insights-Analyzing-the-Meaning-Behind-the-Level-of-Off-Exchange-Trading-Part-II.pdf.

[15] *See infra* Section II.A.

[16] Virtu, Measuring Real Execution Quality at 2, Presentation at SEC Investor Advisory Committee (June 10, 2021) ("Virtu 2021 SEC Presentation"), *available at* https://www.sec.gov/comments/265-28/26528-8901054-242178.pdf.

[17] SIFMA Insights Report, *supra* note 14, at 14–15.

annual basis.[18] Accordingly, in 2020, wholesalers provided investors with an estimated **$7.2 billion** in benefits through size improvement.

Commission Savings: As reflected in a study conducted by former SEC Chief Economist S.P. Kothari, commission-free trading translated into savings of over **$8 billion** per year in 2020 and 2021.[19]

Immediacy of Execution: As Professor Lewis explains, wholesalers currently provide significant benefits to investors by offering nearly immediate execution of investors' orders.[20] The latency that would be introduced by the contemplated auction regime would result in substantially inferior execution quality. Based on our analysis of actual trade data, investors could be harmed by as much as **$2.9 billion** annually.[21]

- **The Proposed Rule Will Severely Harm Competition Among Market Centers and Will Lead to an Unhealthy Concentration of Liquidity and Risk**

The Proposed Rule's mandate that nearly all retail orders be routed to an "auction" would:

- Result in greatly diminished competition, and therefore liquidity and execution quality, for retail orders. Under a mandated auction regime, retail brokers' routing choices will be severely restricted and retail brokers will be compelled to send orders to auction centers regardless of execution quality. Moreover, market participants will not have a compelling reason to respond to every auction; rather, liquidity providers will respond and provide price improvement on a case-by-case basis, solely driven by their trading and economic interest with respect to a particular transaction. The adverse impacts on

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[18] Charles Schwab, *U.S. Equity Market Structure: Order Routing Practices, Considerations, and Opportunities* at 13 (Sept. 7, 2022) ("Schwab White Paper"), *available at* https://content.schwab.com/web/retail/public/about-schwab/Schwab-2022-order-routing-whitepaper.pdf; Robert Battalio and Robert Jennings, *Why Do Brokers Who Do Not Charge Payment for Order Flow Route Marketable Orders to Wholesalers?* at 5 (Dec. 14, 2022), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4304124; *see also* Anne Haubo Dyhrberg, Andriy Shkilko, and Ingrid Werner, *The Retail Execution Quality Landscape* at 30 (Fisher College of Business Working Paper No. 2022-03-014, Dec. 27, 2022) *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4313095 (estimating that "[i]f wholesalers were to be removed, retail investors would pay billions in additional trading costs").

[19] S.P. Kothari, Travis Johnson, Eric So, *Commission Savings and Execution Quality for Retail Trades* at 1 (Dec. 6, 2021), *available at* https://papers.ssrn.com/sol3/Papers.cfm?abstract_id=3976300.

[20] *See* Ex. A, Craig Lewis, *The SEC's Proposed Rules for Equity Market Structure* at 8 (Section II.A) (Mar. 28, 2023) (citing James J. Angel, Lawrence E. Harris, and Chester S. Spatt, *Equity Trading in the 21st Century: An Update*, Quarterly Journal of Finance, Vol. 5, No. 1, at 12 (2015)).

[21] Virtu analyzed all marketable retail orders it received for 2020–2022 and found that the NBBO moved against investors on 20.15% of the shares and in investors' favor on 5.07% of the shares at 300ms from the time of order receipt. We measured the dollar value in the move of the far-touch (*i.e.*, what was the cost (or benefit) of the bid/offer moving for a selling/buying order). The gross costs/benefits of NBBO moves against/in-favor of investors amounted to $1.170Bn and $0.278Bn, respectively, for a net cost against investors of $0.891Bn per year. Grossing up the net cost based on 30.6% (Virtu's market share of marketable retail orders for the three-year period) suggests a total cost to all retail investors of $2.911Bn/year. Significantly, even at just 100ms, this net cost is a staggering $2.597Bn/yr. Using the same gross-up methodology, the average number of auctions per day from 2020-2022 was 7.0M with a maximum of 22.5M auctions in a single day.

liquidity and pricing will be particularly acute for orders in the roughly 6,000 thinly traded securities which wholesalers currently incentivized to compete for and fill with their own capital.

- Result in massive information leakage which would discourage auction responders and limit their willingness to bid/offer aggressively;[22]

- Lead to diminished liquidity on exchanges, which will harm institutional investors and lead to inferior executions for retail investors;

- Lead to pronounced concentration of activity among a handful of venues. Virtu's analysis estimates that the exchanges will be required to handle anywhere from 7 million to 22 million retail auctions per day[23] – and the accompanying operational risk on exchanges will threaten investor welfare, as evidenced by instances of exchange outages, including the NYSE outage on January 24, 2023, further discussed in Sections IV.C and VI.H below.

➢ **The Commission's Economic Analysis That Purportedly Justifies the Proposed Rule Is Severely Flawed**

As described in more detail in Section V below, the Commission is required under the Exchange Act to conduct a cost-benefit analysis justifying any proposed rule. In doing so, it must always consider "the impact any . . . rule or regulation would have on competition," and may not adopt any "rule or regulation which would impose a burden on competition not necessary or appropriate in furtherance of the purposes" of a securities laws.[24] If the Commission fails to "apprise itself—and hence the public and Congress—of the economic consequences of a proposed regulation," that failure makes promulgation of the rule arbitrary and capricious and not in accordance with law.[25]

The Commission's economic analysis is fundamentally deficient because it is based on faulty assumptions, highly questionable estimates, and flawed analyses. Among other significant deficiencies, the Commission fails to consider how the Proposed Rule will disrupt the current market structure, including the intense competition between and among trading centers, and in turn, jeopardize substantial benefits that currently inure to retail investors, including significant price and size improvement. As a result, the Commission incorrectly assumes that the purported

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[22] *See*, *e.g.*, Chester Spatt, Thomas Ernst, Jian Sun, *Would Order-by-Order Auctions Be Competitive?* (Mar. 8, 2023) (finding that information leakage associated with auctions disincentivizes participation), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4300505. Note that the SEC appears to have overlooked this study, along with a number of others cited in this letter in analyzing the costs and benefits of the Proposed Rule.

[23] *See supra* note 21.

[24] 15 U.S.C. § 78w(a)(2); *see id.* § 78c(f) (whenever the Commission is engaged in rulemaking generally "and is required to consider or determine whether an action is necessary or appropriate in the public interest, the Commission shall also consider, in addition to the protection of investors, whether the action will promote efficiency, competition, and capital formation"); *id.* § 80a–2(c) (similar).

[25] *Business Roundtable* v. *SEC*, 647 F.3d 1144, 1148 (D.C. Cir. 2011).

benefits for the Proposed Rule—including the estimated $1.5 billion in price improvement—would be "in addition" to price improvement that investors currently receive rather than instead of that improvement. Moreover, the Proposed Rule assumes that institutional investors will trade in qualified auctions, but the Commission provides no evidence that institutional investors will participate. In fact, institutional investors are unlikely to participate in qualified auctions because of, among other reasons, the information leakage inherent in the Proposed Rule. And while the Commission justifies the Proposed Rule by claiming that retail investors might receive an additional $1.5 billion in price improvement, the methodology the Commission used to reach this estimate is fundamentally flawed because it primarily relies on unreliable realized spread calculations. Finally, the Commission issued the Proposed Rule at the same time as three other interrelated proposed rules without analyzing the cumulative impact of the rules if they are adopted. Thus, the purported costs, benefits, and effects of any one proposal are certain to change depending on whether one or more of the other proposals are adopted.[26]

II. The Proposed Rule Threatens Over $20 Billion of Annual Benefits Retail Investors Receive Today from Intense Competition Between Market Centers

A. The Existing Market Structure Fosters Intense Competition Among Market Centers, Including Between Wholesalers

In creating the national market system in 1975, Congress found that it is in the public interest and appropriate for the protection of investors and the maintenance of fair and orderly markets to assure, among other things, "fair competition among brokers and dealers, among exchange markets, and between exchange markets and markets other than exchange markets."[27] Today's market structure is premised on that mandate, fostering deep competition among all types of market centers, which translates into unique, unparalleled benefits for U.S. retail investors and resiliency in the ecosystem. This competition among market centers has provided investors with greater choice and certainty of execution at prices that are better and sizes that are larger than what is available at the NBBO across all exchanges, significantly lower execution costs over time, and better ancillary services from retail and online broker-dealers.

The Commission has itself recognized the benefits of competition among markets and noted that consolidating order flow would result in the loss of beneficial competition. When it adopted the final rule promulgating Regulation NMS, the Commission explicitly stated that it sought to avoid a "centralized system that loses the benefits of vigorous competition and innovation among individual markets."[28]

Today's competitive landscape has provided significant benefits and opportunities to retail investors. Under the existing market structure, we have seen a persistent narrowing of bid-ask spreads over the last couple decades, due in part to changing technology, market innovation, and

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[26] Equally problematic, the Proposed Rule's reliance on non-public CAT data renders it impossible for commenters to verify the accuracy of the economic analysis, and its Rule 605 report data, which the Commission acknowledges is inadequate and is the subject of a separate rule proposal, engenders little confidence in its analysis.

[27] 15 U.S.C. §78k-1(a)(1)(C)(ii).

[28] Regulation NMS Final 2005 Rule, *supra* note 5, at 13. *See* discussion in Section VI.B.

competition.[29] For example, Angel, et al. (2015) have demonstrated that the effective spreads of NYSE- and Nasdaq-listed stocks fell by more than 50% from 2002 to 2013.[30] According to a recent study by Modern Market Initiative, for "certain large cap stocks and ETFs" the bid-ask spreads had declined from "a range of 1-3 basis points by the 2010s [… to] about ½ a basis point [by 2020]."[31]

As acknowledged by Professor Lewis, segmentation of retail order flow is a key feature of current equity market structure that benefits retail investors. Compared to retail order flow, institutional order flow tends to involve sustained trading in a particular direction making it more predictive of future price movements, primarily because, on average, institutional order flow is more informed.[32] When a market maker quotes a price on an exchange, the quote needs to be wide enough to compensate the market maker for taking on greater adverse selection risk, which is the risk that the market will move against the liquidity provider due to trading against an investor who may have superior information about the stock.[33] In contrast, when a wholesaler accepts orders from retail brokers, the wholesaler anticipates lower adverse selection risk so the wholesaler is therefore willing to offer liquidity at a better price (*i.e.*, pay a higher price to buy from a retail sell order or accept a lower price to sell to a retail buy order).[34] It can then share the cost savings with the retail investor in the form of price improvement and size improvement.[35]

While the Proposed Rule attempts to preserve the benefits of segmentation, it fails to acknowledge another mechanism that, when combined with segmentation, promotes superior execution quality for retail orders—the intense competition between wholesalers, which retail brokers enforce. As Professor Lewis states in his report, "[b]rokers, who have a duty of best execution, use multiple wholesalers and rigorously evaluate the execution quality of each wholesaler, adjusting their order routing based on execution quality."[36] In fact, "[r]etail brokers are well-positioned to hold wholesalers to account if they provide poor execution quality by increasing their allocation of order flow to those wholesalers who offer better execution quality."[37] Wholesalers, in turn, are "incentivized to find liquidity at the best prices available in the market,

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[29] Kristin Wegner, Katherine Hong, Anush Musthyala, and Sreeya Narra, *A Report on Market Automation and Dependable Liquidity in Times of Uncertainty: Investor Savings from Narrowed Bid Ask Spreads, Markets Functioning as Intended* at 3, 5, Modern Markets Initiative (July 2022), *available at* https://www.modernmarketsinitiative.org/wp-content/uploads/2022/07/MMI-BME-Study-Q2-2022.v7.5.pdf.

[30] Ex. A at 6; James J. Angel, Lawrence E. Harris, and Chester S. Spatt, *Equity Trading in the 21st Century: An Update*, Quarterly Journal of Finance, Vol. 5, No. 1, at 5–6 (2015). The authors observe effective spreads on NYSE and Nasdaq-listed stocks based on Rule 605 reports. Effective spread is "twice the difference between the actual trade price and the midpoint of the quoted [National Best Bid or Order] NBBO at the time of order receipt."

[31] Wegner et al., *supra* note 29, at 10. *See also* Ex. A at 6 (Section II.A.).

[32] Ex. A at 11 (Section II.B).

[33] *Id.*

[34] *Id.* at 11–12.

[35] *Id.*

[36] *Id.* at 12.

[37] *Id.* at 29 (Section III.D).

including hidden liquidity inside the NBBO, and to match or improve on the best price they find."[38] Wholesalers therefore "offer[] high levels of price improvement (including a large portion of midpoint executions), offer[] size improvement, and guarantee[] execution for all retail trade flow, which includes the execution of [] illiquid stocks."[39] Schwab has described this dynamic and noted how it benefits retail investors, stating that it has "invested in its own order routing capabilities to ensure that seamless routing changes from one wholesaler to another can be made based on execution performance" and that "[a]nchoring the allocation of order flow on execution quality aligns the incentives of wholesalers and brokerage customers, who directly benefit, for example, by receiving better price improvement on their trades."[40] Academic studies have validated this competitive dynamic. For example, Dyhrberg et al. find that wholesalers with lower realized spreads in a given month tend to attract more order flow in the following month. In addition to wholesalers' accountability to broker-dealers, they are also accountable to regulators, since they (along with broker dealers) have a duty of best execution.[41]

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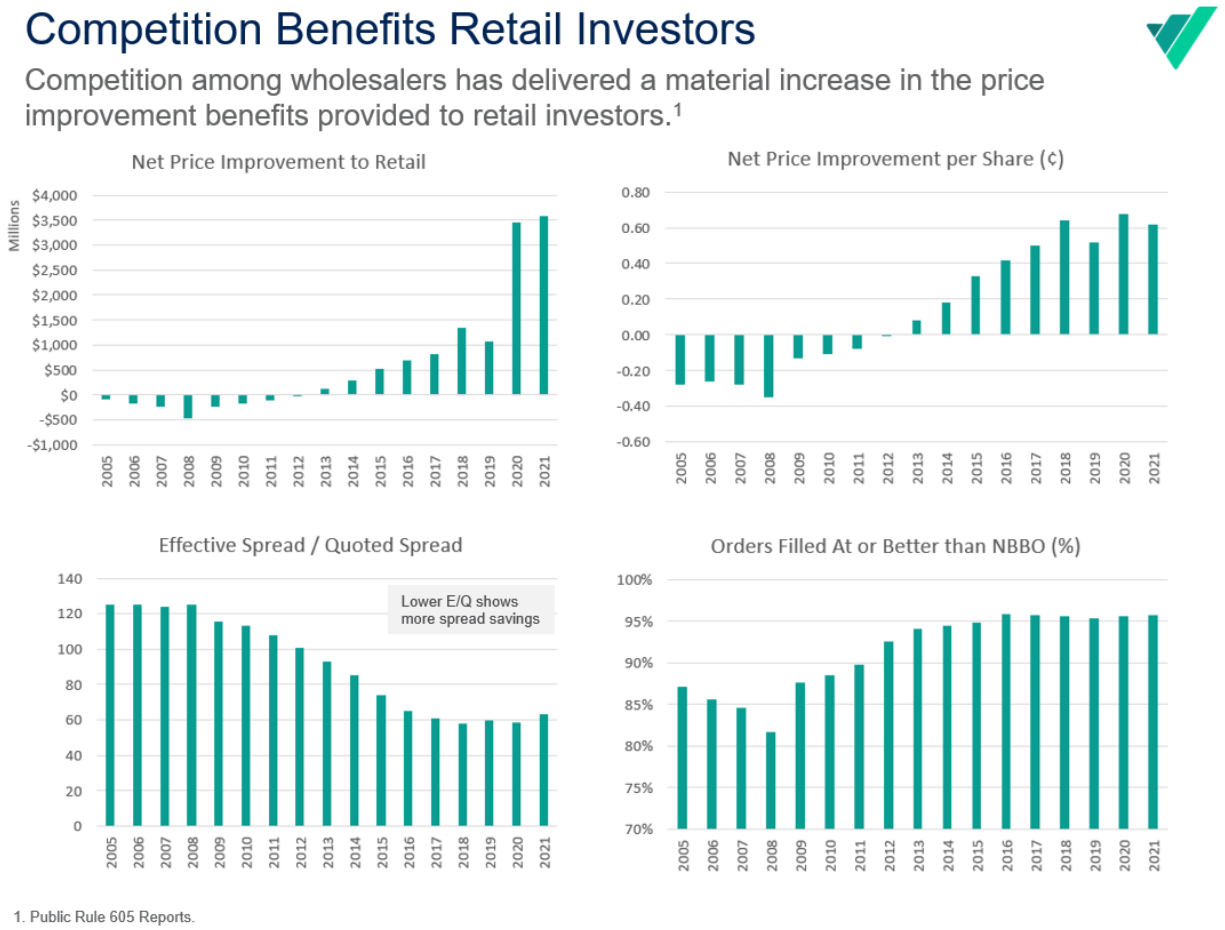
[38] *Id.* at 12 (Section II.B).

[39] *Id.* at 28 (Section III.D).

[40] *Id.* at 12 (Section II.B) (citing Schwab White Paper, *supra* note 18, at 14).

[41] *Id. See* Dyhrberg et al., *supra* note 18, at 5–6.



1. Public Rule 605 Reports.

This competitive dynamic and accountability of wholesalers to retail brokers delivers significant price improvement to retail investors, as demonstrated in the chart above. It has also driven high fill rates and provided size improvement, even on undesirable trades.

The Proposed Rule would remove the accountability of market centers, such as wholesalers, to retail broker dealers that incentivizes those market centers to compete.[42] More specifically, under the Proposed Rule, retail brokers will be required to route orders to qualified auctions (subject to potential to execute at midpoint or better) and therefore will no longer have control over where to route orders. They will no longer be able to demand that wholesalers provide the highest quality execution on all orders, no matter how undesirable the execution, and wholesalers would therefore no longer have a commercial incentive to offer benefits such as price and size improvement.[43] Rather, wholesalers will have the opportunity to "cherry-pick" the order trades that they find most advantageous to trade against in qualified auctions. Although the Commission claims that most retail orders "could simply be internalized by wholesalers, similar to the current market," it acknowledges that the prices would be "inferior . . . compared to what they might have received under the current market structure"[44] and the Commission fails to recognize that

42 Ex. A at 12.

43 *Id.* at 27–29.

44 *Id.* at 30; Proposed Rule, *supra* note 2, at 287.

wholesalers will no longer have an incentive to provide highest quality execution on all orders. In short, whereas in the current market structure, wholesalers are commercially obligated to provide best execution on all orders, wholesalers will no longer be subject to any such obligation under the Proposed Rule.

B. The Proposed Rule Jeopardizes $3.6 Billion in Price Improvement and $7.2 Billion in Size Improvement That Retail Investors Receive Today

As described above, under the current market structure, wholesalers compete against each other and other liquidity sources, including exchanges and ATSs, to deliver the most price improvement to their customers. Wholesalers fill marketable orders at prices typically better than the NBBO – regardless of the quantity of shares displayed and available at the NBBO. When an order is filled at a price that is better than the NBBO, we refer to this as price improvement (or "PI"). When an order is filled for more shares than are available at the NBBO, we refer to this a size improvement. We refer to these benefits together as "real price improvement" or "Real PI."

Price improvement data is reflected in Rule 605 reports, which highlight that wholesalers provided over $3.6 billion in price improvement to retail investors in 2020, as reported in an analysis conducted by SIFMA.[45] Real PI, which includes both price and size improvement, is approximately 3X what is reported in Rule 605 reports.[46] Accordingly, in 2020, wholesalers provided an estimated additional **$7.2 billion** in size improvement benefits to retail investors that was not reported in Rule 605 reports. Market-wide benefits from "real price improvement" approached **$11 billion** annually in 2020 and 2021.[47] As described in detail above, the benefits of Real PI are the intentional result of today's competitive ecosystem—in which wholesalers have a commercial obligation to execute every order that is sent to them and to provide Real PI to attract those orders and remain commercially competitive. The Proposed Rule will severely disrupt this competitive ecosystem and therefore jeopardize the Real PI provided to retail investors under the current market structure.

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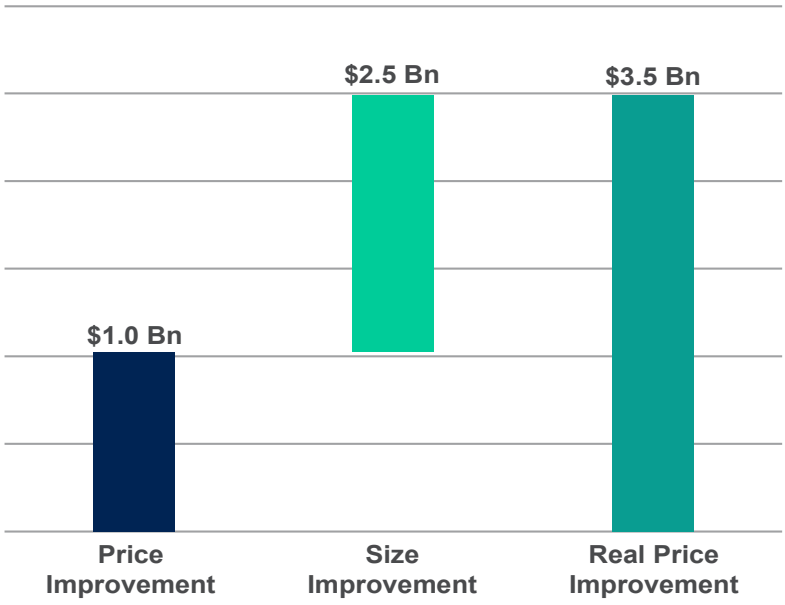
45 SIFMA Insights Report, *supra* note 14, at 14.

46 Virtu 2021 SEC Presentation, *supra* note 16, at 3.

47 SIFMA Insights Report, *supra* note 14, at 5.

Virtu's Price and Size Improvement (2021)



In 2021 alone, Virtu provided over $3 billion in real price improvement to retail orders, through a combination of (i) trading at prices better than the NBBO and (ii) size improvement in the form of transactions executed for quantities greater than available at the NBBO yet still at prices at or better than the NBBO.[48] Reaching similar conclusions, in a recent report analyzing publicly available exchange data, Schwab estimated that "routing to wholesalers saved Schwab's clients at least $3.4 [billion] in 2021, [versus] what their outcomes would have been from utilizing exchanges," adding that "even these statistics understate the value provided by non-exchange market centers as they do not capture the value generated from size improvement, which is the ability for market centers to execute orders exceeding displayed size at or better than the NBBO."[49] Schwab further estimated that the current market structure will provide ***over $120 billion of direct benefit exclusively to retail investors over the next ten years***.[50]

Confirming the substantial benefits that wholesalers provide investors in the form of price and size improvement, Notre Dame's Robert Battalio and Indiana University's Robert Jennings analyzed execution quality of retail orders routed to wholesalers compared to execution quality of orders routed to other market centers.[51] To analyze execution quality across wholesalers as a group, the authors studied Rule 605 reports from six wholesalers during May 2022 and compared execution quality to two sample exchanges, Nasdaq and NYSE Arca. The study found that, for market orders, "the six wholesalers, on average, beat Nasdaq's (NYSE Arca's) price improvement rate in more than 75% (90%) of S&P 500 stocks during the sample month. The wholesalers' price

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48 *See* also Ex. A, Appendix Section B for detailed analysis of December 2020 orders.

49 *See* Schwab White Paper, *supra* note 18, at 13.

50 *Id*. at 15–16.

51 Battalio & Jennings, *supra* note 18.

improvement rate advantage increases with order size. Similarly, the wholesalers provide a better average effective spread relative to Nasdaq (NYSE Arca) for more than 75% (95%) of sample stocks."[52] "***In total, the wholesaler(s) provided a benefit of $388 million in better-than-quoted executions for marketable orders in the sample month***."[53] Based on these findings, the authors concluded that "wholesalers provide a valuable service to their clients in fulfilling their best execution requirements and, when measured by Rule 605 reports or placed in a controlled competition with two popular exchanges, furnish clients with an advantage over the execution quality provided by the sample exchanges."[54] Battalio and Jennings also analyzed other benefits offered by wholesalers, including:

> *Size Improvement*: "[W]holesaler(s) executes orders for more size than is available in aggregate at the NBBO at prices that better those prices available in an aggregate view of all displayed odd lot, top of book and depth of book quotes from all exchanges. ***For our sample, the estimated value of this 'size improvement' more than doubles the price improvement reported in the mandated SEC Rule 605 reports***. At a more basic level, the wholesaler(s) executes more than 80% of trades associated with orders having a desired quantity exceeding the quoted size at prices better than the quoted prices."[55]
>
> *Odd Lot/Short Sale Execution*: Second, the authors concluded that, "in addition to providing price improvement to orders in the scope of Rule 605 reporting execution quality statistics, the wholesaler(s) offers price improvement to odd lots (even after adjusting the quote benchmark prices to include displayed odd lot limit orders) and short sell orders. Together, ***this adds about 17% to the dollar value of price improvement that the wholesaler(s) provided to marketable retail orders in May 2022***."[56]
>
> *Supplemental Price Improvement*: Finally, the authors found "that even when wholesaler(s) choose not to internalize an order, they improve the prices received from other trading venues. In [their] sample data, the wholesaler(s) provides sufficient supplemental price improvement at their expense to turn what would have resulted in price disimprovement for the average externalized order in May 2022 into a modest level of price improvement."[57]

The Commission does not address the significant benefits delivered to retail investors in the existing current market structure, such as substantial price and size improvement, or analyze whether investors will lose those benefits under the Proposed Rule.

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[52] *Id*. at 6.

[53] *Id*. at 36 (emphasis added).

[54] *Id*. at 8.

[55] *Id*. at 35 (emphasis added).

[56] *Id*. at 35 (emphasis added).

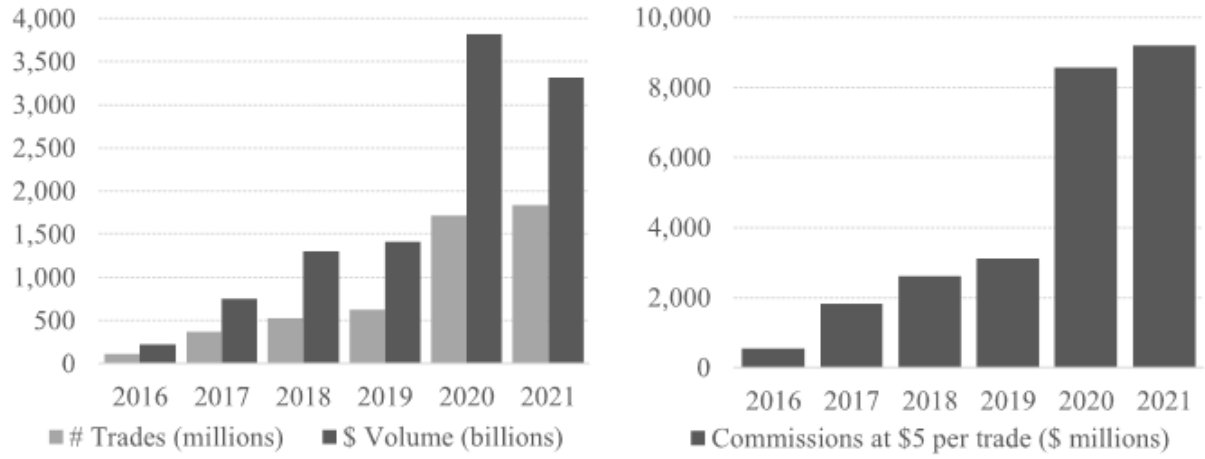
[57] *Id*.

C. The Proposed Rule Jeopardizes $8.5 Billion Annual Savings From Commission-Free Trading

The current market structure has also given rise to commission-free trading that has saved retail investors billions of dollars, made possible by the competitive model in which wholesalers compete to service retail brokers and even pay some retail brokers for order flow ("PFOF"). To quantify this benefit, in a recent study, former SEC Chief Economist and MIT professor S.P. Kothari, and fellow academics Travis Johnson and Eric So, analyzed public and private order execution data to assess the impact of PFOF on execution quality for retail investors. The study concluded that, because of PFOF, retail brokers have been able to eliminate unnecessary fees and commissions, saving retail investors billions of dollars.[58]

Specifically, the professors analyzed the impact of zero commission trading – made possible in part by PFOF – on retail execution quality. Using datasets from the NYSE Trade and Quote (TAQ) database, the authors estimated the amount of retail activity from August 2017 through September 2021. The study found that the number of trades in that period grew substantially, from 367 million trades in 2017 to about 1.8 billion in 2020. The authors estimated that retail investors saved (or would have saved) over ***$8 billion per year in 2020 and 2021 alone due to zero commissions***.[59]

Growth in Retail Trade and Savings from Zero Commissions



Commission-free trading has also improved retail investors' access to markets. Chair Gensler himself has noted that "retail investors have greater access to markets than any time in the past" and "[m]ore retail investors than ever are accessing our markets."[60] Indeed, there are "historically high levels of retail investor participation in 2020–2022, with more than half of

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58 Kothari et al., *supra* note 19, at 1.

59 *Id*. at 3.

60 Gary Gensler, Chair, SEC, Market Structure and the Retail Investor: Remarks before the Piper Sandler Global Exchange Conference (June 8, 2022), *available at* https://www.sec.gov/news/speech/gensler-remarks-piper-sandler-global-exchange-conference-060822.

Americans invested in the stock market, and the volume of retail investor participation at a historic high of 20%-25% of daily trading volume."[61] Notably, a recent study by FINRA on investor demographics found a significant increase in the proportion of new investors since the major wire houses abandoned commissions in 2019: "A substantial proportion of investors joined the market relatively recently. The percentage of investors who began investing within the two years prior to the 2021 NFCS is nearly as large as the percentage who began in the preceding eight years (21 percent and 25 percent, respectively)."[62] As the National Association of Securities Professionals submits in its comment letter, the ability for retail investors to trade and invest at lower costs has resulted in increased retail investor participation, "particularly among lower income and diverse Americans" and traditionally underserved communities.[63]

D. The Proposed Rule Jeopardizes $2.9 Billion Annual Savings From Immediacy of Order Execution

Under the current market structure, wholesalers provide retail investors a significant benefit in the form of immediate trade execution. Over the last couple of decades, execution times for most trades have fallen dramatically. In 2022, many retail brokers report average execution times well under 0.1 seconds for orders with 1,999 shares or fewer.[64] With multiple retail brokers touting execution speeds from 0.01 to 0.05 seconds, retail investors can trust that when they place an order—even on volatile stocks—their order will be executed at the displayed price.[65]

Under the Proposed Rule, orders not executed at the midpoint would be required to be routed to flash auctions operated by national securities exchanges before such orders could be executed by any trading center that does not qualify as an "open competition trading center." The Proposed Rule "specifies that the time period for a qualified auction must be no shorter than 100 milliseconds (1/10th of a second) and no longer than 300 milliseconds (3/10^{ths} of a second) after an auction message is provided for dissemination in consolidated market data."[66] Despite the

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61 Wegner et al., *supra* note 29, at 2 (footnote omitted).

62 FINRA, *Investors in the United States: The Changing Landscape* at 1 (Dec. 2022), *available at* https://www.finrafoundation.org/sites/finrafoundation/files/NFCS-Investor-Report-Changing-Landscape.pdf.

63 National Association of Securities Professionals, Comment Letter at 1, 3 (Feb. 28, 2023), *available at* https://www.sec.gov/comments/s7-32-22/s73222-20158252-326340.pdf?utm_source=substack&utm_medium=email, ("While NASP strongly supports the SEC's mission to protect investors, including with regard to the prices they receive when they buy and sell stock, NASP fears that these proposals will harm millions of retail investors by making the process of buying and selling stock more difficult and potentially reinstating barriers to entry – both economic and non-economic – that for decades kept younger, lower income, female, and minority individuals out of the market altogether.")

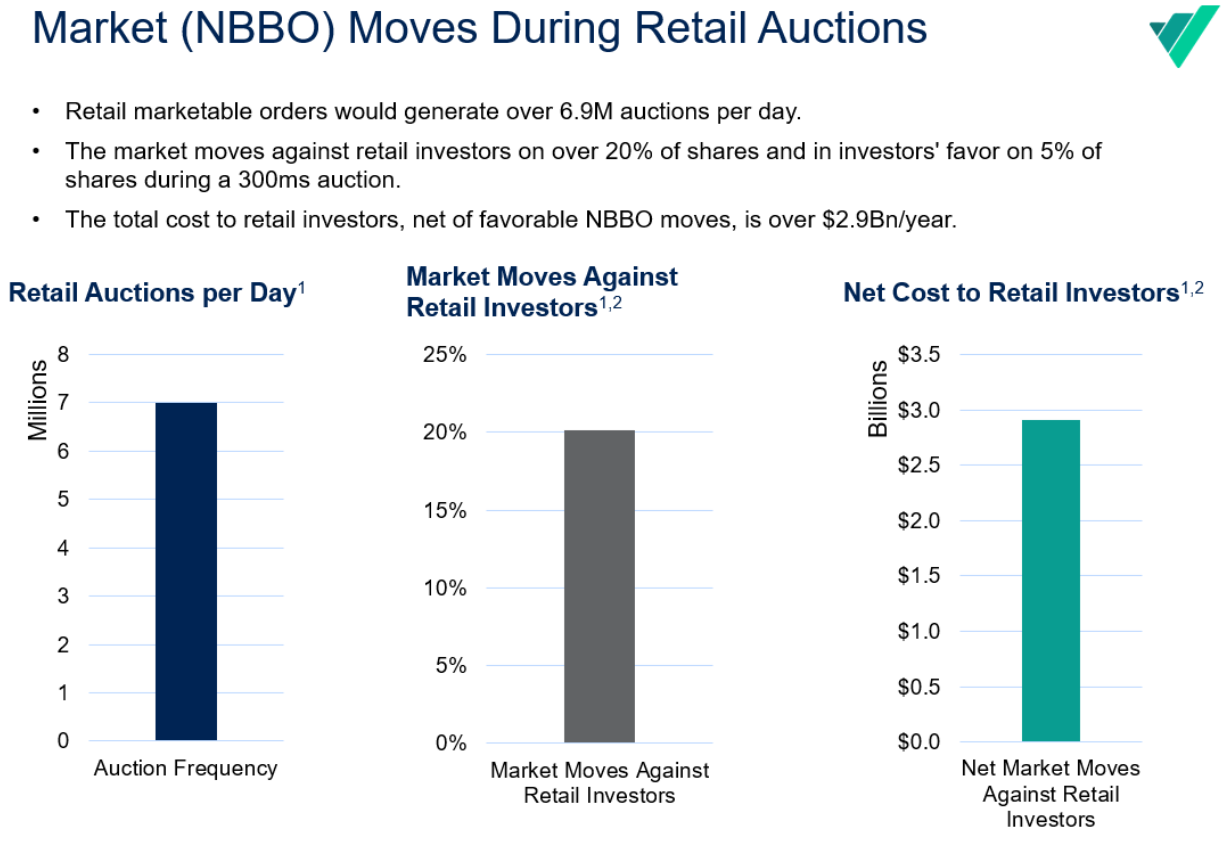
64 Ex. A at 8 (Section II.A) (reporting execution times in Q1 2022 were around 0.05 seconds or less). *See, e.g.*, Fidelity, *Commitment to execution quality*, https://www.fidelity.com/trading/execution-quality/overview (reporting average execution speed of 0.08 seconds for Q4 2022); TD Ameritrade, *Order Execution Quality*, https://www.tdameritrade.com/tools-and-platforms/order-execution.html (reporting execution speed of 0.04 seconds for Q4 2022).

65 *See*, *e.g.*, Charles Schwab, *Schwab Order Execution Advantage*, www.schwab.com/execution-quality; Two Sigma, *Retail Execution Quality Statistics – Wholesale Market Maker Perspective*, https://www.twosigma.com/businesses/securities/execution-statistics/.

66 Proposed Rule, *supra* note 2, at 111.

additional latency that the auctions would add to the order execution process, the Commission contends "that the overall efficiency with which marketable orders of individual investors are executed would not be significantly affected by the Proposal."[67] This conclusion is erroneous.

We performed our own analysis to test this theory on 2020-2022 trading data and found that the added latency that would be introduced by the changes contemplated under the Proposed Rule would, in fact, result in significantly worse executions that could cost investors between **$2.3 and $2.9 billion** annually for auction latency between 100 and 300 milliseconds. Specifically, we performed an analysis of actual Virtu trade data to estimate the number and notional value of trades that would be required to be routed to auctions under the Proposed Rule. We then measured price movements of those orders 100 milliseconds, 200 milliseconds, and 300 milliseconds after the order. Our analysis projected that retail marketable orders would generate approximately 7 million auctions per day, and we found that the NBBO moves "against" the investor over 20% of the time (and "in favor" of the investor only 5% of the time).



In the Proposed Rule, the Commission substantially underestimates the value of immediacy and the benefits it confers on investors. This becomes apparent in reviewing the SEC's purportedly empirical "fading probability" analysis. Specifically, the Commission took steps to estimate the

[67] *Id*. at 330.

likelihood of a move in the NBBO spread ("fading probability") as the lag time increases from the internalization of an order versus the fading probability after NBBO quote movements.[68] The Commission's analysis found "that the probability of the NBBO quotes adversely moving after the execution of an individual investor order range from 1.8% at 25 milliseconds after an internalized trade, to 2.8% at 100 milliseconds—an increase of 1 percentage point. Extending the duration to 300 milliseconds, the maximum time of the auction as proposed, increases the likelihood of adverse fading to 4.6%."[69]

The fact that the SEC's analysis is belied by Virtu's own analysis – which shows that the market moves against retail investors on over 20% of shares during 300 milliseconds – is unsurprising because the SEC's methodology for identifying retail trades was flawed. Instead of using CAT data, the Commission chose to rely on an algorithm from an academic study by Boehmer et al. (2021) that attempts to identify retail trades.[70] But, as the Commission acknowledges, the algorithm only identified 35% of all retail trades.[71] And that 35% is not even a representative sample; the algorithm excludes certain types of trades, such as mid-point trades and round tick trades, when identifying retail trades, but those trades have higher quote fades.

A recent study by Professors Battalio and Jennings describes the consequences of using an inferior data set, rather than CAT data, and they performed a more complete analysis to estimate the potential costs of failed auctions.[72] They found that the annualized cost of adverse movements 100 milliseconds after orders are received by wholesalers (*i.e.*, the shortest duration allowed for an auction under the Proposed Rule) is between $1.73 and $1.88 billion. When adjusted for 300 milliseconds (the longest duration), the cost ranges from $2.17 to $2.55 billion. They conclude that:

> . . . the potential costs of failed auctions may be on the same order of magnitude as the potential benefits of successful auctions. In several of the scenarios we examine, the Commission's auction proposal has the potential of creating a net loss for retail investors even if one accepts the Commission's estimated benefit. We believe the Commission would reach similar conclusions if it used actual retail orders and our revised methodology. Given our results and the high degree of uncertainty as to how the Commission's Order Competition Proposal will impact equity markets, we suggest the Commission table this rule proposal. As we wrote in our 2016 paper, "Can Brokers Have it all? On the Relation between Make-Take Fees and Limit Order Execution Quality" written with Shane Corwin, we believe the rule changes contained in the Commission's proposed Disclosure

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68 Proposed Rule, *supra* note 2, at 288.

69 *Id*. at 289.

70 *Id*. at 288 n.572 (citing Ekkehart Boehmer et al., *Tracking Retail Activity*, 76 J. Fin. 2249 (2021)).

71 *Id*. (citing Brad M. Barber et al., *A (Sub)penny For Your Thoughts: Tracking Retail Investor Activity in TAQ* (last revised Sept. 30, 2022) (unpublished manuscript), *available at* https://ssrn.com/abstract=4202874).

72 Robert Battalio and Robert Jennings, *On the Potential Cost of Mandating Qualified Auctions for Marketable Retail Orders* (Mar. 28, 2023), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4403047.

> of Order Execution Information rule will go a long way toward eliminating any inefficiencies in the market for marketable retail orders.[73]

Further, Virtu attempted to replicate the SEC's analysis using actual historical retail trade data. The Commission's method estimates an annual cost to retail investors of $210M. Using actual historical retail trade data, we show a potential annual cost of $2.9Bn – and this assumes that every order receives midpoint execution.[74] This result is further evidence of the Commission's flawed economic analysis and its substantial underestimation of the massive benefits that currently accrue to investors from the immediate executions offered by wholesalers.

E. The Proposed Rule Jeopardizes Execution Certainty

Finally, in the existing regulatory construct under which wholesalers are already subject to best execution requirements, they stand ready to promptly execute all they retail order flow they receive. As discussed above, this highly competitive environment provides retail investors the comfort of receiving fast and highly competitive execution quality across a broad range of securities. Unlike the national auction participants contemplated under the Proposed Rule, who will have no obligation to respond to auctions nor any best execution obligations, wholesalers like Virtu must use reasonable diligence to ascertain the best market for every order they accept and promptly execute the order such that the resultant price to the customer is as favorable as possible under prevailing market conditions. Wholesalers achieve this result by committing their own capital to fill most marketable orders, *i.e.*, internalizing the orders, at prices that are in most instances better than the NBBO, regardless of the quantity of shares displayed at the NBBO.

For example, Virtu internalizes approximately 70% of marketable orders in order to achieve the execution quality levels required to compete with other market centers, including other wholesalers. If a wholesaler does not meet its clients' exacting standards of service and maintain competitive levels of execution quality, the clients can and do choose to route their orders to alternative competing market centers. Virtu's clients demand the same exceptional level of execution quality for all orders, including the 30% of orders which Virtu does not internalize. For these non-internalized orders, Virtu uses sophisticated order routing technology to source liquidity from numerous other market centers in a manner that is designed to optimize the execution quality it achieves. While Virtu seeks price improvement, including midpoint, for these orders and finds some price improved liquidity on other market centers, in most cases price improved liquidity is not available and the majority of these orders ultimately interact with displayed liquidity on exchanges. [75] While Virtu passes the fill prices it obtains from these other market centers back to its clients, Virtu also frequently adjusts these fill prices to further improve the fill prices it receives from other market centers in order to ensure it continues to deliver competitive levels of execution quality for its clients. In other words, Virtu provides supplemental price improvement to its clients by giving them a better fill price than the fill price that Virtu received in the market.

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[73] *Id.* at 1.

[74] *See supra* note 21.

[75] *See* Statement of Doug Cifu, SEC Investor Advisory Committee Meeting at 5 (June 10, 2021), *available at* https://www.sec.gov/comments/265-28/26528-8901053-242178.pdf.

III. The Proposed Rule Represents a More Sweeping and Radical Overhaul of the Equity Market Structure than Regulation NMS, Yet Lacks Sufficient Input from the Public and Key Constituencies

The SEC first announced it would be considering a slate of market structure rule changes on June 9, 2021.[76] One year later, the SEC confirmed it was working on rule proposals designed to overhaul the national securities market structure by reducing minimum pricing increments on exchanges, enhancing disclosure of order execution quality, creating a new best execution requirement, and driving order-by-order competition in equities markets.[77] Now, 18 months have passed between the agency announcing consideration of these proposals and releasing them to the public. Not only are the proposals the most sweeping contemplated change in equity market structure since Regulation NMS, but they also would constitute a substantially more expansive and radical overhaul of our capital markets than Regulation NMS. Yet the SEC has failed to seek input from market participants or otherwise engage in public discourse.

The SEC's hurried and haphazard rulemaking process limited the Commission's opportunity to obtain meaningful stakeholder input. Instead of "rushing to market" four proposed rules that are – both individually and collectively – likely to dramatically impact the marketplace and introduce unknown risks and/or harms to investors, the SEC could have followed a more iterative, data-driven process similar to that used in proposing and finalizing Regulation NMS in 2005, a process that involved significant interaction and collaboration with the public to ensure the SEC arrived at the best outcome possible.

As early as 2000, in connection with a proposal to rescind the NYSE Rule 390, the Commission explained that it historically "has not attempted to dictate the ultimate structure of the securities markets" but rather "has sought to establish, monitor, and strengthen a framework that gives the forces of competition sufficient room to flourish and that allows the markets to develop according to their own genius."[78] This is exactly the approach the Commission then followed in adopting Regulation NMS, which was "designed to modernize and strengthen the regulatory structure of the U.S. equity markets."[79] Reg NMS implemented a number of rules addressing order execution and handling. It was promulgated following a thorough, five-year "broad and systematic review to determine how best to keep the NMS up-to-date."[80] Prior to promulgating the final rule, the Commission "engaged in a thorough, deliberate, and open rulemaking process" that "provided

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[76] Gary Gensler, Chair, SEC, Prepared Remarks at the Global Exchange and FinTech Conference (June 9, 2021), *available at* https://www.sec.gov/news/speech/gensler-global-exchange-fintech-2021-06-09.

[77] Gary Gensler, Chair, SEC, Remarks Before the Piper Sandler Global Exchange Conference: "Market Structure and the Retail Investor" (June 8, 2022), *available at* https://www.sec.gov/news/speech/gensler-remarks-piper-sandler-global-exchange-conference-060822.

[78] NYSE Rulemaking: Notice of Filing of Proposed Rule Change To Rescind Exchange Rule 390; *Commission Request for Comment on Issues Relating to Market Fragmentation,* Release No. 34-42450; File No. SR-NYSE-99-48 (Feb. 23, 2000), *available at* https://www.sec.gov/rules/sro/ny9948n.htm.

[79] Regulation NMS Final 2005 Rule, *supra* note 5, at 1.

[80] *Id*. at 7.

at every point an opportunity for public participation and debate."[81] It "actively sought out the views of the public and securities industry participants."[82]

Even prior to formulating its Reg NMS proposals, the Commission held "multiple public hearings and roundtables, an advisory committee, three concept releases, the issuance of temporary exemptions intended in part to generate useful data on policy alternatives, and a thorough dialogue with industry participants and investors."[83] After the issuance of the notice of proposed rulemaking, the Commission "held a public hearing on the proposals . . . that included more than 30 panelists representing investors, individual markets, and market participants from a variety of different sectors of the securities industry."[84]

Because the Commission "believed that there were a number of important developments at the public hearing," it "published a supplemental request for comment and extended the comment period on the proposals . . . to give the public a full opportunity to respond."[85] After receiving more than 700 comment letters, the Commission prepared "several studies of relevant trading data to help evaluate and respond to the views of commenters."[86] The Commission then "reproposed Regulation NMS in its entirety . . . to afford the public an additional opportunity to review and comment on the details of the rules and on the staff studies."[87] The Commission then considered an additional 1,500 comments on the re-proposal.[88]

By contrast, since June 9, 2021, when the Commission first announced it would be considering a slate of market structure rule changes, it has not formally sought any input from the public on the suite of interrelated equity market structure proposals. The Commission has not held a single roundtable on its proposed market structure changes. In fact, the SEC declined requests from the industry to hold a roundtable on the proposals – although this has been its practice in the past – leaving market participants to host their own roundtable, which was attended by only one SEC staff member who was unable to participate in any of the discussion.[89] The agency has failed to create working groups, avoided public hearings, and otherwise shut out meaningful industry

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81 *Id*. at 8.

82 *Id*.

83 *Id*.

84 *Id*.

85 *Id*.

86 *Id*. at 9.

87 *Id*.

88 *Id*.

89 SIFMA managed an Equity Market Structure Roundtable to discuss the Commissions' reform ideas on September 13, 2022. Information is available at https://www.sifma.org/resources/general/sifma-equity-market-structure-roundtable/. Capitol Account, *Wall Street Gathers to Rip Gensler's Planned Overhaul of Trading Rules*, Sept. 14, 2022, *available at* https://www.capitolaccountdc.com/p/wall-street-gathers-to-rip-genslers (noting SEC's departure from its tradition of holding roundtables for financial executives to share their thoughts when it contemplates major changes and recapping SIFMA's round table, or the "roundtable that Gensler won't hold").

engagement in the process of drafting the proposals.[90] Meanwhile the concepts reflected in the current proposals are remarkably consistent with those laid out in June 9, 2021 in spite of the numerous concerns raised by a diverse set of market and industry participants and the plethora of facts, data, and analysis promulgated by market participants, industry experts, and highly credible academics. This is especially concerning because the Proposed Rule will upend the existing regulatory regime by shifting away from a venue competition model with significant benefits for retail investors, and adopting an uncertain order-by-order competition model. If adopted, the Proposed Rule and the other market structure rules proposed the same day would drastically alter our best-in-class national securities market system – more so than any SEC action since Regulation NMS was adopted.

Professor Battalio said it well in a recent interview when he suggested that the better approach would be to "[i]ntroduce a proposal at a time, listen to both sides, and if the government thinks it's compelling, maybe they should have a pilot study, this is what they have done in the past. I mean, Reg NMS was a huge deal that was discussed for two, three years [whereas] this was rolled out quickly with the comments ending at the end of March: what's the rush?"[91]

IV. The Proposed Rule Will Create Risks and Costs Harmful to Retail Investors and Other Market Participants

In addition to the prospect of retail investors losing more than $20 billion of savings from price/size improvement, commission-free trading, and immediacy of executions, the auction regime contemplated under the Proposed Rule also would introduce a wide variety of other risks and increased costs that are likely to harm retail investors and other market participants.

A. The Proposed Rule Will Severely Harm Liquidity in the Marketplace, Especially in Thinly Traded Securities, and Would Result in the Quoted NBBO Spread Becoming Wider

Where competition is limited, investor costs go up and liquidity is diminished. This is illustrated, by contrast, as described by Professor Lewis, by the evolution of the marketplace since the adoption of Regulation NMS, which fostered productive competition and resulted in decreased trading costs for investors and an increase in liquidity.[92] As discussed above, limiting the trading of a security to an auction process will eliminate the competitive forces that drive innovation,

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[90] Furthermore, the SEC failed to provide a meaningful response to Virtu's June 2022 request under the Freedom of Information Act ("FOIA"), causing Virtu to file suit under FOIA on November 29, 2022, *Virtu Financial, Inc.* v. *U.S. Securities and Exchange Commission*, 1:22-cv-10088-JHR (S.D.N.Y.). Virtu seeks communications between SEC officials and certain national securities market participants regarding retail stock order handling to help Virtu, and other commentors, to better understand the rulemaking process and participate in the public comment period. Despite repeated attempts to adjust and limit the custodians and search terms, the SEC has only recently begun to produce a small subset of requested communications and has positioned itself to run out the clock by the March 31, 2023 deadline for public comment for the remainder of the documents. This delay prejudices potential commentors and ultimately deprives the SEC of fully informed comment.

[91] Janice Kirkel, *Industry fears burden of SEC's giant equity market makeover*, Risk.net, Feb. 24, 2023, *available at* https://www.risk.net/regulation/7956100/industry-fears-burden-of-secs-giant-equity-market-makeover.

[92] *See* Ex. A at 6–8 (Section II.A).

improve performance, and provide investors with choice. Currently, there are a variety of innovative liquidity offerings catering to investors' different trading horizons and liquidity needs. Every investor has the ability today to route their orders to any venue that makes sense for them. Limiting this choice by reducing the number of market centers available for trading these securities will severely impact liquidity in the marketplace, especially in thinly-traded securities.

The Proposed Rule will also result in massive information leakage for both retail and auction responders, which will further discourage participation.[93] The constraints on liquidity caused by an auction regime will be especially acute in thinly traded symbols, which will increase volatility and issuers' cost of capital. In a regime which mandates that nearly all retail orders be routed to an auction and therefore severely diminishes the competitive dynamic amongst wholesalers and other non-auction market centers, there will no longer be a compelling incentive for wholesalers to provide competitive execution quality in thinly traded securities by offering their own capital and providing liquidity to internalize these orders. This reduced liquidity is likely to lead to worse execution prices for the less liquid securities. The Proposed Rule fails to quantify or otherwise genuinely address this risk both for thinly traded securities or for the retail investors trading in those securities.

Furthermore, it is well understood that liquidity providers are often willing to provide better prices for retail order flow than for institutional order flow because retail order flow is subject to lower adverse selection risk (*i.e.*, retail order flow tends to be less correlated with future adverse price movements). Currently, wholesalers execute some retail order flow on exchanges. Therefore, the NBBO quote on the exchanges is set by liquidity providers that are facing a mix of institutional and retail order flow. If retail order flow were mandated by rule to be routed to auctions, the liquidity providers setting the NBBO quote on exchanges would then not be interacting with the retail order flow from wholesalers, and instead be facing relatively more institutional order flow and the spreads would widen accordingly to adjust for the worsening in average adverse selection.[94]

B. The Mandatory Consolidation of Order Flow to Particular Market Centers Is Anti-Competitive and Incongruent with the Commission's Obligation to Assure Fair Competition Between Exchange Markets and Other Markets

The Exchange Act, as amended, requires the SEC to "assure . . . fair competition . . . between exchange markets and markets other than exchange markets."[95] Congress directed the SEC to "use its authority under this chapter to facilitate the establishment of a national market system for securities . . . in accordance with the findings and to carry out the objectives set forth in paragraph (1) of this subsection," including assuring fair competition between exchange markets

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[93] This dynamic was documented in a paper recently released by former SEC Chief Economist Chester Spatt and academics Thomas Ernst and Jian Sun, who conducted an empirical study modeling and evaluating two distinct methods of executing segregated retail trades: broker's routing and an order-by-order auction. The paper found that the significant information leakage associated with auctions leads participants to bid conservatively, leading to worse investor outcomes, particularly in times of limited liquidity. Spatt et al., *supra* note 22.

[94] *See* Nasdaq, *A Data-driven Summary of the SEC's New Proposals* (Feb. 13, 2023), *available at* https://www.nasdaq.com/articles/a-data-driven-summary-of-the-secs-new-proposals.

[95] 15 U.S.C. § 78k-1(a)(1)(C)(ii)

and other markets.[96] This reflects Congress's understanding and intent that markets would compete with one another and evolve. When it amended the Exchange Act in 1975, Congress explicitly provided that:

> The objective is to enhance competition and to allow economic forces, interacting within a fair regulatory field, to arrive at appropriate variations of practices and services. Neither the markets themselves nor the broker-dealer participant in these markets should be forced into a single mold. Market centers should compete and evolve according to their own natural genius and all actions to compel uniformity must be measured and justified as necessary to accomplish the salient purposes of the Securities Exchange Act, assure the maintenance of fair and orderly markets and to provide price protection for the orders of investors.[97]

The Proposed Rule runs contrary to this mandate because it is distinctly anticompetitive and unreasonably favors exchanges over other markets.[98] The volume of NMS stocks traded on exchanges has remained at around 60% for the last 13 years, suggesting there is sufficient competition preventing any one trading venue from taking over a disproportionate share of the market, and therefore, no need for a rule that artificially increases exchange volumes.[99] Mandating that all orders not executed at midpoint or better have to be routed to one of a handful of exchanges that have essentially identical auction structures undermines the competition across different types of market centers, as explicitly envisioned by Congress, and destroys the incentive to innovate or for individual market makers to attract future order flow by providing more price improvement. And although the Commission has expressed concern about market concentration among wholesalers,[100] the Commission inexplicably seeks to resolve this purported problem by funneling retail orders into an extremely concentrated market, where just three exchanges account for the vast majority of NMS stock volume.[101]

By eliminating competition, the Proposed Rule will have the effect of undercutting the benefits currently provided by wholesalers to retail investors in the order execution process, including the delivery of vital market liquidity and efficient order execution. Market intermediaries will be forced to spend needlessly to comply with new rules, increasing costs that will ultimately be passed on to the individual investor in one form or another. The net result will be a more costly, less fair, less accessible, less competitive, more concentrated, and more opaque

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96 15 U.S.C. § 78k-1(a)(2).

97 H.R. Rep. No. 94-123, at 51 (1975).

98 The Proposed Rule also is inconsistent with Section 11A(c)(3) of the Exchange Act by effectively requiring segmented orders to participate in qualified auctions on an exchange, notwithstanding that the OCR would allow for an NMS Stock ATS to operate a qualified auction.

99 *Compare* Proposed Rule, *supra* note 2, at 191–192 *with* 2010 Concept Release, *supra* note 6, at 15.

100 *See* Proposed Rule, *supra* note 2, at 6–7. But we have detailed above, see Section VI.B, wholesalers already operate in highly competitive markets and are already incentivized to provide the best possible order executions for investors.

101 *See* Cboe, U.S. Equities Market Volume Summary, https://www.cboe.com/us/equities/market_share/.

market for individual investors. In addition, without the check of competition from other market participants, it is inevitable that the exchanges will impose new and potentially hidden costs.

In 2018, Commissioner Robert Jackson cautioned against the risks associated with relying on major exchanges that are for-profit enterprises and that "in for-profit hands, SEC oversight designed for not-for-profit exchanges can be dangerous."[102] If exchanges, which compete with wholesalers and other market participants for retail orders, are given responsibility for conducting an auction-based equities order execution system, the auction system will inevitably diminish, if not eliminate, competition between exchanges and wholesalers.[103] Retail investors will be exposed to an increased risk that the exchanges will build in additional costs and fees as part of that system because "their profit motive gives exchanges every reason to structure stock markets in a way that maximizes their rents" and "for-profit companies can be counted on to do one thing: pursue profit."[104] Indeed, Commissioner Jackson observed that exchanges have imposed various costs and fees on investors "like the cost of connecting to the exchange."[105]

Furthermore, the Exchange Act authorizes the Commission to "prohibit brokers and dealers from effecting transactions in securities registered pursuant to section 78l(b) of this title otherwise than on a national securities exchange, if the Commission finds, on the record after notice and opportunity for hearing, that," among other reasons, "the fairness or orderliness of the markets for such securities has been affected in a manner contrary to the public interest or the protection of investors."[106] The Proposed Rule has the effect of prohibiting broker-dealers from executing transactions otherwise than on a national securities exchange because it mandates routing to those exchanges when an order is not executed at the midpoint or better. Although it provides that an ATS may also operate a qualified auction, the Commission acknowledges that this is not realistic as "it would be difficult for new ATSs to meet the requirements to run qualified auctions or because the requirements of operating a qualified auction would be incompatible with the business models of most currently operating ATSs."[107] The Commission has not made any finding that off-exchange transactions are impacting the fairness or orderliness of markets, and it has not met its burden to justify effectively limiting these trades to national securities exchanges.

C. Less Competition Among Market Centers Will Lead to an Unhealthy Concentration of Activity and Risk

Under the Proposed Rule, the vast majority of retail order flow would be directed to national securities exchanges. Despite the Commission's assertion that a variety of market centers,

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[102] Robert Jackson, Commissioner, SEC, *Unfair Exchange: The State of America's Stock Markets* (Sept. 19, 2018), *available at* https://www.sec.gov/news/speech/jackson-unfair-exchange-state-americas-stock-markets.

[103] As just one manifestation of its negative impact on competition, the Proposed Rule requires that all resting orders on an exchange (both hidden and displayed) be included in an auction. This inclusion of resting liquidity in auctions is anti-competitive because exchanges that operate an auction will be able to market the ability for "all resting liquidity to interact with retail flash auctions" as they seek to attract liquidity to their order books.

[104] Jackson, *supra* note 102.

[105] *Id*.

[106] 15 U.S.C. § 78k-1(c)(3)(A)(i).

[107] Proposed Rule, *supra* note 2, at 305.

such as ATSs, would be qualified to host auctions, the reality is that no ATS is likely to be able to satisfy the SEC's seven-prong test for eligibility to operate auctions.[108] And no other market participant would find a compelling commercial basis to fill that role, leading to an intentional and dangerous concentration of activity and risk on the exchanges.

Nowhere in the Proposed Rule does the Commission acknowledge that concentrating all trading activity in a handful of market centers could present risk to the efficient and orderly operation of the markets, and there is no discussion of whether the national securities exchanges that the Proposed Rule would task with operating the auctions have the operational and technological capacity to do so.[109]

The potential risk of concentrating so much activity at the exchanges was highlighted just a few weeks after the rule was proposed when the New York Stock Exchange suffered a technology outage that resulted in the cancellation of thousands of trades and the dissemination of thousands of erroneous trade prints to the tape. The outage, which was caused by a manual operator error, caused wild market swings when trading opened on January 24, and resulted in significant customer losses.[110] This episode exposes four critical issues that are not addressed in the Proposed Rule.

First, the Proposed Rule fails to devote any discussion to the technological readiness of the exchanges to assume the central role of running an auction regime. This new and completely untested approach would amplify the volume of trades processed by exchanges and completely overhaul the technological infrastructure for accepting trades from other market participants. The record of significant outages experienced by the exchanges over the years suggests that the exchanges may not be prepared to meet the technological demands that would be required under the contemplated auction construct.[111] The Commission also fails adequately to address what will happen in the event of an outage or other technological failure by an exchange, and what the costs of such a failure while running auctions would be.

Furthermore, all new auction information (auction messages, responses, as well as quotations at finer pricing increments under the proposed tick size rule) would need to be tracked

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[108] *See id*. at 90-–98, setting forth seven elements that ATSs are required to satisfy to qualify as "Open Competition Trading Centers" that may operate auctions.

[109] Nor does the proposal account for a similar possibility of outages of Securities Information Processors ("SIP"), during which notifications of auctions could not go out.

[110] *See*, *e.g.*, John McCrank, Medha Singh, Chuck Mikolajczak, *NYSE glitch leads to busted trades, prompts investigation*, Reuters, Jan. 24, 2023, *available at* https://www.reuters.com/markets/us/some-nyse-listed-stocks-briefly-halted-trading-after-market-open-2023-01-24/#:~:text=NEW%20YORK%2C%20Jan%2024%20(Reuters,than%20250%20securities%20being%20busted; *New York Stock Exchange blames manual error for Tuesday trading glitch*, Financial Times, Jan. 25, 2023, *available at* https://www.ft.com/content/76b63f3f-24f7-4c10-9bac-b1e20185f775.

[111] *See*, *e.g.*, William Watts, *A brief history of recent market outages, snafus*, Market Watch, July 9, 2015, *available at* https://www.marketwatch.com/story/a-brief-history-of-recent-market-outages-snafus-2015-07-08.

as part of CAT data requirements. But the Commission does not acknowledge or quantify the possible costs and strains of recording and maintaining this additional data.[112]

Second, there is no discussion in the Proposed Rule as to whether the exchanges running the auctions will have liability for technological or other errors that result in customer harm. Unlike wholesalers, the national securities exchanges that would be responsible for administering the auctions under the Proposed Rule are not subject to the duty of best execution. We question, therefore, which party will be responsible when the price moves away from an order that is left waiting for a counterparty to trade against it?

Third, under current law, exchanges enjoy a high degree of regulatory immunity and limited liability. The radical market overhaul contemplated by the Proposed Rule raises a host of never before contemplated liability issues that are completely unaddressed. As market structure analyst Larry Tabb appropriately observed, this "whole issue comes down to liability – who is on the hook when something goes awry . . . Currently exchange liability is capped, and we've seen this occur in the past and [on January 24, 2023]. The SEC needs to revisit the issue of the cap if they want this auction proposal to go through smoothly."[113]

Finally, retail investors would lose additional services and protections provided by wholesalers, who would no longer have a compelling incentive to offer them. As part of the services wholesalers traditionally have provided to retail brokers and their customers, wholesalers have stepped in and made customers "whole" – voluntarily and spurred by the need to remain competitive – in situations where operational problems outside of the control of the wholesaler affected the quality of execution for the order. For example, if there is a technical malfunction on an exchange that resulted in an order failing to execute promptly or properly, there is a process for submitting a claim to the exchange to request satisfaction, but the exchanges do not always agree to make customers whole (and even if they do, it is costly for brokers to go through the process of submitting claims). To illustrate, consider what happened on Nasdaq in connection with the Facebook IPO, where system design and capacity issues resulted in a system failure and significant losses to investors. In situations like these, wholesalers have stepped in to provide redress to retail customers.[114] If wholesalers were to exit the market, they would no longer provide such guarantees to retail customers and their brokers. In addition, the off-exchange execution option that wholesalers provide may help retail investors avoid losses resulting from things like exchange malfunctions in the first place.

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[112] The Commission does not appear to have considered the impact of the Proposed Rule on the quality, utility, and latency of consolidated market data and the cumulative impact of the proposed rules, including the extent to which they may undermine certain of the Commission's goals in adopting the Market Data Infrastructure Rules.

[113] Katherine Doherty and Lydia Beyoud, *NYSE Glitch Caught Up in Fight Over SEC Rewrite of Trading Rules*, Bloomberg, Feb. 1, 2023, *available at* https://www.bloomberg.com/news/articles/2023-02-01/nyse-glitch-caught-up-in-fight-over-sec-rewrite-of-trading-rules.

[114] *See, e.g.*, John McCrank, Ashutosh Pandey, *Knight Capital hit by Facebook loss, wants Nasdaq to pay*, *Reuters*, May 23, 2012, *available at* https://www.reuters.com/article/uk-knightcapital-facebook/knight-capital-hit-by-facebook-loss-wants-nasdaq-to-pay-idUKBRE84M1HO20120524 ("Knight is a leading market maker in U.S. equities, and in that role, had to compensate its clients for losses that occurred when orders originally placed at $42 a Facebook share, for example, were not filled until the price had fallen below that level.").

D. The Auction Mandate Will Severely Impact Retail Brokerage Firms and Result in Substantial Execution Costs Being Passed on to Investors

Under an auction regime, customers of retail brokerage firms will be the real losers as they will no longer benefit from the competitive ecosystem that has brought transaction costs down and driven incentives for market centers to offer the best execution quality possible (see Section II.A above). Under the new market structure contemplated by the Proposed Rule, retail brokers will incur substantial new costs, including increased trading expenses and the overhead costs for operating as a so-called "conflicted" broker-dealer. Without exchange rebates and payment for order flow, retail brokers could be forced to pass on billions of dollars in costs to their customers, including by reinstating per-trade commissions. These new costs will make it more difficult for retail brokers and others to continue to invest in technological innovation of the sort that has driven increased trade execution speeds and execution certainty. And increased costs would ultimately render the business model itself unsustainable and unattractive, in effect operating as an indirect ban on payment for order flow.

The exchanges operating the auctions will also incur new costs to develop and operate the auctions, and likely will need to charge new fees to cover those costs. While the Proposed Rule would prohibit the exchanges from expressly charging fees to access the auctions, the exchanges could increase fees for other services to compensate for the additional costs of operating the auctions, for example, by increasing the spread between the make/take fee for regular institutional orders.

E. The Purported Order-By-Order Competition Contemplated By the Proposed Rule Will Result in Worse Outcomes for Investors Because of the "Winner's Curse"

For all of the reasons articulated above, we are concerned that the so-called order-by-order competition model contemplated by the Proposed Rule will result in worse outcomes for retail investors.[115] As Commissioner Uyeda observed in his dissent, it is "quite possible that mandating order-by-order competition could result in inferior outcomes for retail investors, harm venue competition, and discourage further innovation, given the rigidity inherent in a mandated structure. Indeed, the new 'qualified auctions' may encounter certain market failures that result in retail investors being made worse off in terms of spreads. For example, there may be a 'winner's curse' problem in order-by-order auctions that could reduce retail investor welfare."[116]

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[115] As a threshold matter, we question the Commission's presumption that there is not already "order by order" competition in today's market. If a wholesaler is able to ping multiple markets to look for liquidity inside the spread in real time on an order-by-order basis, this is one form of order-by-order competition. Perhaps it is Chair Gensler's idea of an order-by-order auction that is misguided.

[116] Mark T. Uyeda, Commissioner, Statement on Proposed Rule Regarding Order Competition ("Uyeda Dissent"), *available at* https://www.sec.gov/news/statement/uyeda-order-competition-20221214.

Former SEC Chief Economist Chester Spatt and fellow academics Thomas Ernst and Jian Sun elaborated on the nature of this "winner's curse" in their paper released in December 2022, noting:

> In the order-by-order auction model, in contrast, brokers bid after observing their signals. In the auction, the participant with the lowest realized inventory cost will always win the auction with the most aggressive bid, leading to an increase in allocative efficiency. The common-value nature of the auction, however, creates a winner's curse problem; whichever participant wins the auction learns that all other participants had higher signals of cost. Consequently, market participants bid conservatively in the auction.
>
> The welfare of investors can be lower in the order-by-order auction setting, particularly at times of limited liquidity. Intuitively, market makers compete after observing their signals. When their signals are more precise about their true liquidity signals, they are more informationally heterogeneous, and their bidding strategies will rely more on their observed signals. Limited liquidity leads to less pressure from auction competitors, less aggressive bids, and larger profits for trading against retail orders. While order-by-order auctions have higher allocative efficiency than broker's routing, order-by-order auctions have *less* competition than broker's routing.[117]

The lesson here is that Chair Gensler's vision of promoting fairness for retail investors through an order-by-order auction process is not likely to improve outcomes for retail investors. Instead, retail investors are likely to experience worse outcomes resulting from less competition in the marketplace, leading to diminished liquidity and fewer incentives for market participants to offer the superior execution quality that is available today.

V. The Commission Must Conduct Economic Analysis to Justify the Proposed Rule

The Securities Exchange Act of 1934, 15 U.S.C. § 78a *et seq.*, (the "Exchange Act") expressly requires the Commission to consider, as part of the rulemaking process, "the impact any . . . rule or regulation would have on competition," and may not adopt any "rule or regulation which would impose a burden on competition not necessary or appropriate in furtherance of the purposes of" the securities laws.[118] In addition, whenever the Commission is engaged in rulemaking generally "and is required to consider or determine whether an action is necessary or appropriate in the public interest, the Commission shall also consider, in addition to the protection of investors, whether the action will promote efficiency, competition, and capital formation."[119]

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[117] Spatt et al., *supra* note 22, at 3–4 (emphasis added).

[118] 15 U.S.C. § 78(w)(a)(2).

[119] 15 U.S.C. § 78c(f); *see id.* § 80a-2(c).

Circuit courts have repeatedly interpreted the above and similar statutory provisions, as well as general requirements under the Administrative Procedure Act, to require that the Commission conduct an economic analysis of any proposed rule.

> [T]he Commission has a unique obligation to consider the effect of a new rule upon "efficiency, competition, and capital formation," 15 U.S.C. §§ 78c(f), 78w(a)(2), 80a-2(c), and its failure to "apprise itself—and hence the public and Congress—of the economic consequences of a proposed regulation" makes promulgation of the rule arbitrary and capricious and not in accordance with law. (citation omitted). . . . [T]he Commission acted arbitrarily and capriciously for having failed . . . adequately to assess the economic effects of a new rule. Here, the Commission inconsistently and opportunistically framed the costs and benefits of the rule; failed adequately to quantify the certain costs or to explain why those costs could not be quantified; neglected to support its predictive judgments; contradicted itself; and failed to respond to substantial problems raised by commenters.[120]

Further, courts have admonished that when agencies are charged with conducting an economic analysis, "it is a small matter to abide by the injunction of the arithmetic teacher: Show your work!"[121] As the Supreme Court has explained, an agency's most fundamental responsibility in issuing a rule is to "examine the relevant data and articulate a satisfactory explanation for its action including a 'rational connection between the facts found and the choice made.'" [122]

Executive Order 12866 sets forth the standards that federal agencies should follow when conducting a cost-benefit analysis required under the law:

> Federal agencies should promulgate only such regulations as are required by law, are necessary to interpret the law, or are made necessary by compelling

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[120] *Business Roundtable*, 647 F.3d at 1148–49. For example, in *Am. Equity Inv. Life Ins. Co.* v. *SEC*, 613 F.3d 166, 178 (D.C. Cir. 2010), the court found that the SEC acted arbitrarily and capriciously when it failed to make a finding about the existing level of competition in the marketplace. Although the Commission urged that its rule would increase competition, the court found that, without first developing an understanding of the existing competition levels, the Commission "could not accurately assess any potential increase or decrease in competition." *Id.* In *Chamber of Commerce* v. *SEC*, 412 F.3d 133, 144–45 (D.C. Cir. 2005) the court found that the Commission violated the APA and failed to discharge its "statutory obligation to do what it can to apprise itself—and hence the public and the Congress—of the economic consequences of a proposed regulation" and to consider non-frivolous alternatives. It was not enough that the Commission disclosed difficulties determining certain costs or that it was without a "reliable basis" for determining those costs. *Id.* (internal quotation marks omitted).

Finally, in *Am. Petroleum Inst.* v. *SEC*, 953 F. Supp. 2d 5, 22–23 (D.D.C. 2013), the court found that the Commission failed to adequately consider alternatives when it simply dismissed proposed alternatives as too broad. It should have considered tailored versions of those alternatives and conducted a "fuller analysis" of alternatives "given the proportion of the burdens on competition" by the proposed rule. *Id.* at 23.

[121] *City of Holyoke Gas & Elec. Dep't* v. *FERC*, 954 F.2d 740, 743 (D.C. Cir. 1992).

[122] *Motor Vehicle Mfrs. Ass'n of U.S. Inc.* v. *State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (*quoting Burlington Truck Lines* v. *United States*, 371 U.S. 156, 168 (1962)).

> public need, ***such as material failures of private markets*** to protect or improve the health and safety of the public, the environment, or the well-being of the American people. In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, ***including the alternative of not regulating***… Each agency shall identify the problem that it intends to address (including, where applicable, the failures of private markets or public institutions that warrant new agency action) as well as assess the significance of that problem.[123]

Consistent with these principles, the Commission's Division of Risk, Strategy, and Financial Innovation – now known as the Division of Economic and Risk Analysis ("DERA") – and the Commission's Office of the General Counsel ("OGC") issued guidance in 2012 on economic analysis in Commission rulemakings. The guidance provides that:

> Rule releases ***must include a discussion of the need for regulatory action and how the proposed rule will meet that need***. In some circumstances, there will be more than one justification for a particular rulemaking. Frequently, the proposed rule will be ***a response to a market failure that market participants cannot solve because of collective action problems***. Traditional market failures include market power, externalities, principal-agent problems (such as economic conflicts of interest), and asymmetric information.[124]

At the November 10, 2022, SIFMA Equity Market Conference,[125] the current Director of DERA underscored the importance of this guidance, explaining that identifying a market failure that needs to be addressed is Step 1 in DERA's process in conducting an economic analysis of a rulemaking.

We respectfully submit, that in issuing the Proposed Rule, the Commission has failed to satisfy its obligations under the Exchange Act, Executive Order 12866, the Commission's own administrative guidance, and general obligations under the APA and relevant caselaw to identify a market failure that needs to be addressed, to articulate a satisfactory explanation for its action, to consider the alternative of not regulating, and to assess all of the significant costs and risks of the

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[123] Executive Order 12866, 58 F.R. 51735, Regulatory Planning and Review (Sept. 30, 1993), *available at* https://www.archives.gov/files/federal-register/executive-orders/pdf/12866.pdf (emphases added). As an independent regulatory agency, the Commission is not legally bound by the requirements in Executive Order 12866. The Commission has acknowledged, however, that these principles represent accepted standards of good practice in conducting rulemaking proceedings. *See* Current Guidance on Economic Analysis in SEC Rulemakings at 3–4 (Mar. 16, 2012), *available at* http://www.sec.gov/divisions/riskfin/rsfi_guidance_econ_analy_secrulemaking.pdf.

[124] Current Guidance on Economic Analysis in SEC Rulemakings, *supra* note 123, at 5 (emphasis added).

[125] During the 2022 SIFMA Equity Market Conference, which consisted of a diverse industry audience, 93% of participants who were polled did not believe it was a good idea for the SEC to require auctions in equities markets for retail orders. *See* SIFMA Insights, The 2022 Market Structure Week Debrief, at 14 (Nov. 2022), *available at* https://www.sifma.org/wp-content/uploads/2022/11/SIFMA-Insights-Market-Structure-Debrief-2022-FINAL.pdf.

Proposed Rule – including the substantial harm to investors inflicted by the proposed rules. Its failure to do so renders the Proposed Rule arbitrary and capricious.

As described in detail above, and further addressed below, far from a market failure, the unparalleled retail trading experience that investors enjoy today represents a never-before-seen "market success" that has been achieved under the current equity market structure regulatory framework. Despite the lack of discernable market failure, and resulting need for further rulemaking, the Commission has promulgated rules without properly taking account of associated costs, anticompetitive impact, and detriment to investors and the market, including the potential costs imposed by its simultaneous promulgation of several interconnected and far-reaching rules.

VI. The SEC's Economic Analysis is Fundamentally Flawed and Does Not Demonstrate That the Proposed Rule Would Improve Competition or Benefit Investors

The SEC's theory underlying the Proposed Rule appears to be that the equity markets are not sufficiently "competitive" because "order by order" competition could result in greater price improvement for marketable orders submitted by individual investors. But in its economic analysis justifying the Proposed Rule, the SEC fails to consider a number of costs and risks of the Proposed Rule and its analysis relies on flawed assumptions and faulty logic. Among other things, the Commission fails to consider how the Proposed Rule will disrupt the current market structure—which delivers significant benefits to retail investors—and impede the execution of illiquid securities and significant size improvement. The SEC justifies the Proposed Rule by speculating that it will deliver significant "forgone price improvement" and cost savings to retail investors and capitalize on purportedly available liquidity at the midpoint, but the SEC's analysis is methodologically flawed and fails to take account of logical consequences of the Proposed Rule that will offset these perceived benefits. The SEC also fails to evaluate how the Proposed Rule will interact with the three other rules to be introduced simultaneously with the Proposed Rule, or consider less disruptive paths to enhancing the retail investor experience.

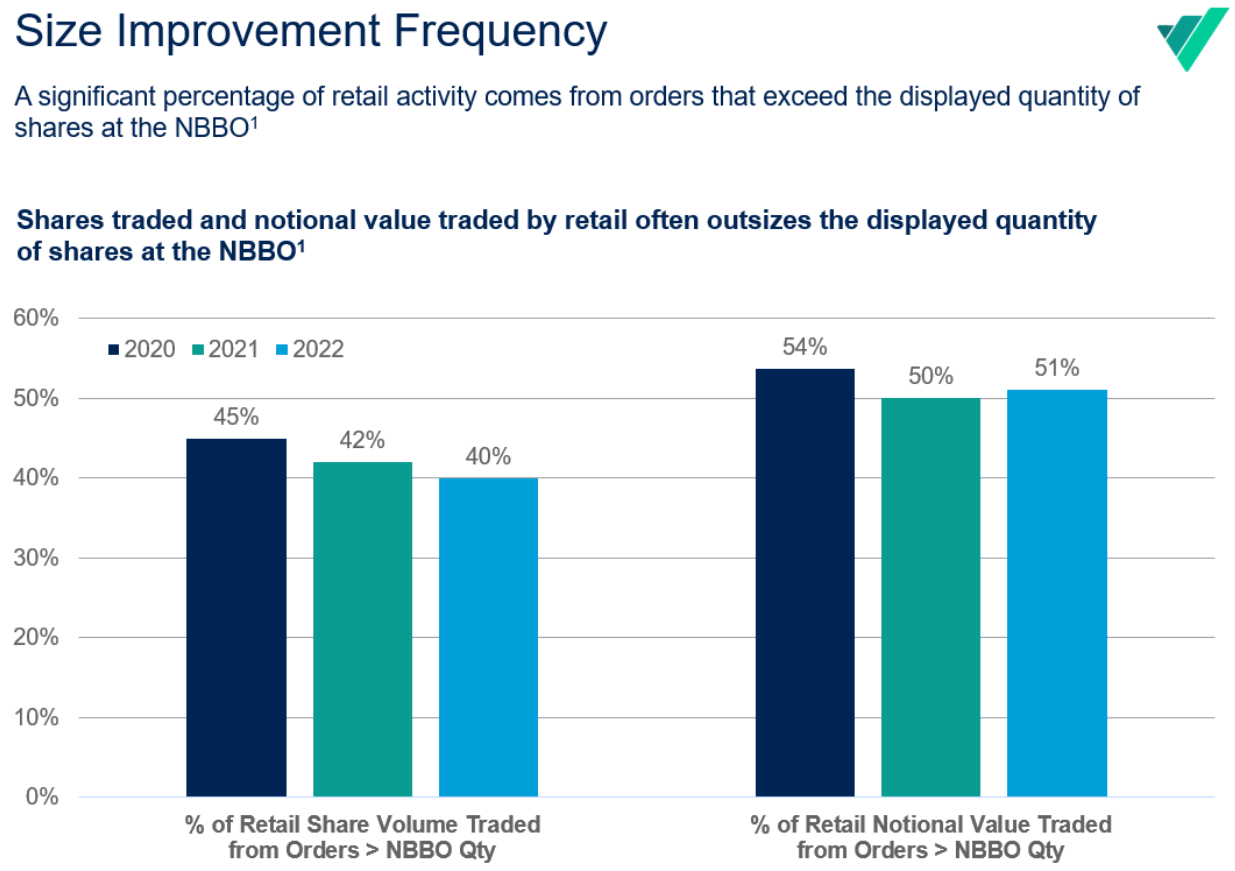
A. The SEC Fails to Consider How the Proposed Rule Will Disrupt the Current Market Structure and Impede Execution Quality

Under the current market structure, competitive pressure induces wholesalers to commit to accepting all order flow from introducing brokers, including order flow in highly illiquid securities.[126] Wholesalers offer improved execution quality and significant size improvement for the most illiquid stocks. If wholesalers were no longer incentivized to accept order flow from retail brokers, they may cease to do so. They would no longer have a best execution obligation, nor would they be incentivized to provide high-quality executions in order to build relationships and their reputations among brokers and their customers. The SEC fails to consider how execution quality is likely to be impeded by the Proposed Rule.

First, the SEC fails to consider the substantial size improvement provided by wholesalers and the impact of the Proposed Rule on that important aspect of execution quality. Wholesalers currently provide substantial size improvement to their customers' order flow, *i.e.*, executing more shares than available at the aggregate NBBO. The Proposed Rule is likely to significantly reduce

[126] *See* Ex. A at 30–32 (Section III.D.2)

the incentive for wholesalers to continue providing the same levels of size improvement. In 2020 and 2021, 45% and 42% of the shares Virtu filled from retail brokers were on orders that outsized the NBBO, respectively. As shown in the chart below, in 2020 and 2021, 54% and 50% of the notional value of shares Virtu filled from retail brokers were on orders that outsized the NBBO, respectively. And although the Commission acknowledges the value of size improvement in the Proposed Rule 605, it fails to consider the impact on size improvement in this Proposed Rule at all, thereby understating the costs of its proposal.[127]



Second, the SEC fails to consider the impact of the Proposed Rule on both the execution certainty of, and price improvement on, thinly traded securities. As discussed above, competitive pressure among wholesalers prevents wholesalers from selectively executing orders they want to fill, so wholesalers are willing to support thinly traded markets by offering their own capital and provided liquidity. Wholesalers are therefore more likely to execute trades in thinly traded securities and provide price improvement on those orders. Virtu estimated that in 2018 the "securities with an [average daily volume] of 50,000 shares or less and 100,000 shares or less [received] price improvement on average of two cents per share and two and one half cents per share, respectively, [on the] orders [Virtu] internalize[d]."[128] The numbers were 4 cents and 2.3

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[127] *See* Ex. A at 32 (Section III.D.2)

[128] Virtu, Letter Re: Market Structure for Thinly-Traded Securities File Number 265-31, at 3 (Apr. 20, 2018), *available at* https://www.sec.gov/comments/265-31/26531-3488782-162247.pdf.

cents, respectively, in 2022. Even the SEC acknowledges in the Proposed Rule that wholesalers provide a much higher fill rate (69.06%) than exchanges (27.31%).[129] If retail orders are routed to auctions, wholesalers will have less opportunity to interact with segmented order flow and will likely be more selective about the stocks they want to trade, leading to worse execution quality and higher costs for retail investors. Commissioner Peirce acknowledged this exact issue in her dissent, stating that "[e]ven if wholesalers participate in these auctions, the order-by-order nature of these auctions will allow them to be much more selective about the stocks they want to trade."[130]

B. The Proposed Rule Fails to Consider the Intense Competition Between Trading Market Centers in the Current Market Structure, Which Delivers Substantial Benefits to Retail Investors

The SEC justifies the Proposed Rule on the basis that there is "suboptimal execution quality" on an order-by-order basis.[131] But it fails to consider the existing intense competition *among trading market centers*, which delivers significant benefits to retail investors, including significant price improvement, size improvement, and certainty of consistently high quality executions, as described in detail above.

As Professor Lewis explains, wholesalers already operate in highly competitive markets and are incentivized to provide the best possible executions, which benefits individual investors.[132] Specifically, wholesalers compete with each other for order flow by providing superior execution quality. They provide superior execution quality by, among other things, investing in technology to find sources of liquidity in the market and by providing supplemental price improvement by using their own capital to improve on the prices received from other trading market centers. In turn, brokers—who often use multiple wholesalers, evaluating their quality and execution—reward wholesalers by providing higher levels of order flow.[133]

When issuing the final rule promulgating Regulation NMS, the Commission recognized the importance of preserving competition among individual markets, and that consolidating order flow would result in loss of important, beneficial competition. It stated that "[Regulation NMS] incorporates two distinct types of competition – competition among individual markets and competition among individual orders – that together contribute to efficient markets."[134] With Regulation NMS, the Commission sought to maintain "an appropriate balance between these two vital forms of competition."[135] It sought to avoid "a totally centralized system that loses the benefits of vigorous competition and innovation among individual markets."[136] The Commission

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[129] *See* Proposed Rule, *supra* note 2, at 214–15, 219 (Tables 5 and 6).

[130] Hester M. Peirce, Commissioner, Statement on Ordering Competition ("Peirce Dissent"), *available at* https://www.sec.gov/news/statement/peirce-order-competition-20221214.

[131] Proposed Rule, *supra* note 2, at 181.

[132] *See* Ex A. at 8–12 (Section II.B), 28–30 (Section III.D.1).

[133] *See id*.; Ex. A Appendix (Section A & Table A1).

[134] Regulation NMS Final 2005 Rule, *supra* note 5, at 12.

[135] *Id*. at 12–13 (emphasis in original).

[136] *Id*. at 13.

noted that the U.S was "fortunate to have equity markets that are characterized by extremely vigorous competition among a variety of different types of markets."[137] The Commission highlighted the existence of both traditional exchanges and market-making securities dealers "which offer both automated execution of smaller orders and the commitment of capital to facilitate the execution of larger, institutional orders."[138] In 2010, when the Commission again conducted a "broad review of the [then] current equity market structure," it again acknowledged the benefits of competition among markets and assessed the benefits inuring to retail investors.[139] The Commission recognized that "mandating the consolidation of order flow in a single venue would create a monopoly and thereby lose the important benefits of competition among markets."[140] It noted that "[t]he benefits of such competition include incentives for trading centers to create new products, provide high quality trading services that meet the needs of investors, and keep trading fees low."[141] The Commission has not explained its marked departure from these stated findings and goals to justify the incongruous Proposed Rule.

A recent paper empirically shows that there is intense competition among trading market centers for retail orders. "The Retail Execution Quality Landscape" by Anne Haubo Dyhrberg, et al. demonstrated that wholesalers receive higher allocations when realized spreads are comparatively lower than those of competitors.[142] In fact, Dyhrberg and her colleagues found that wholesalers provide substantial price improvement, that "[o]n balance, price improvement dominates, and wholesaler intermediation saves retail investors *close to a billion dollars per month*."[143] The paper also shows that realized spreads did not decrease after a new wholesaler, Jane Street, entered the market or after Schwab and TD Ameritrade merged.[144] If wholesalers had not been operating in a highly competitive market, one would expect that either of these events would have reduced the profitability of the wholesalers in the form of reduced realized spreads, yet this did not happen, indicating that wholesalers were already operating in a highly competitive environment.[145] The Commission failed to address this finding, and similar findings, showing that the existing system is highly competitive and that auctions would diminish that competition.[146]

In the Proposed Rule, the Commission fails to recognize the substantial benefits delivered by intense competition among trading market centers,[147] instead arbitrarily prioritizing so-called

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137 *Id*.

138 *Id*.

139 2010 Concept Release, *supra*, at 1.

140 *Id*. at 11.

141 *Id*. at 11–12.

142 Dyhrberg et al., *supra* note 18, at 23. *See also* Schwab White Paper, *supra* note 18, at 17–18.

143 Dyhrberg et al., *supra* note 18, at 1 (emphasis added).

144 *Id*. at 5–6; Ex. A at 29 (Section III.D).

145 Ex. A at 29 (Section III.D).

146 *See*, *e.g.*, Spatt et al., *supra* note 22, at 4.

147 It is notable that the Commission, in the proposed Best Execution rule, acknowledges the significance of competition among retail brokers, stating "[t]he Commission understands that institutional customers often utilize multiple broker-dealers in the handling of their orders, which lowers the costs of switching brokers if they exhibit

order-by-order competition, which will deprive retail investors of the innovations and efficiencies associated with competition among markets. Indeed, Commissioners Peirce and Uyeda recognized this failure in their dissents. Commission Uyeda recognized that "[i]n the securities markets, orders do not compete: venues compete to facilitate transactions that their clients desire with best execution."[148] Similarly, Commissioner Peirce stated that "retail brokers are not choosing among wholesalers on an order-by-order basis, which means that, in the words of the proposal, there is a lack of 'contemporaneous competition among wholesalers.' . . . However, competition need not be order-by-order to be real."[149]

C. The Proposed Rule Fails to Substantiate Its Speculation That Institutional Investors Will Participate in Auctions

The Proposed Rule asserts that liquidity providers would be willing, appropriately incentivized, and able to participate in the auctions because of the "lower adverse selection risk of individual investor orders."[150] But the SEC's economic analysis fails to substantiate this claim and fails to consider disincentives that may deter liquidity providers from participating.

First, institutional investors have varied and numerous algorithms and offerings that enable them to place orders in highly customized settings. If institutional investors found it desirable to interact with retail order flow (*i.e.*, order flow associated with lower adverse selection), one would expect to see their active participation in the existing retail liquidity programs that many of the exchanges already offer and that have been viewed as a "close empirical analogue"[151] to order-by-order auctions. However, as the Commission notes in the Proposed Rule, the volume executed through these retail liquidity programs is minimal, undermining the Commission's assumption that institutional investors would interact with retail flow in the qualified auctions if given the opportunity.[152] Indeed, Commissioner Peirce recognized in her dissent that "although allowing a broader set of market participants to interact with retail order flow is a goal of the proposal, institutional investors may not expend much effort to participate regularly in auctions."[153] Virtu's own analysis suggests that the overlap between retail and institutional interests is quite low. Virtu compared the retail and institutional trade activity in the Top 500 symbols traded in the first quarter of 2021 and found that only 8% of retail volume was in the Top 500 symbols, and only 26% was in Russell 3000 symbols.

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poor execution quality." Best Ex Rule Release, *supra* note 8, at 312–313. But the Commission fails to acknowledge that the exact type of competition that exists among retail brokers exists among wholesalers, which delivers substantial benefits to retail investors.

148 Uyeda Dissent, *supra* note 116 (emphasis in original).

149 Peirce Dissent, *supra* note 130.

150 Proposed Rule, *supra* note 2, at 315.

151 Spatt et al., *supra* note 22, at 4–5.

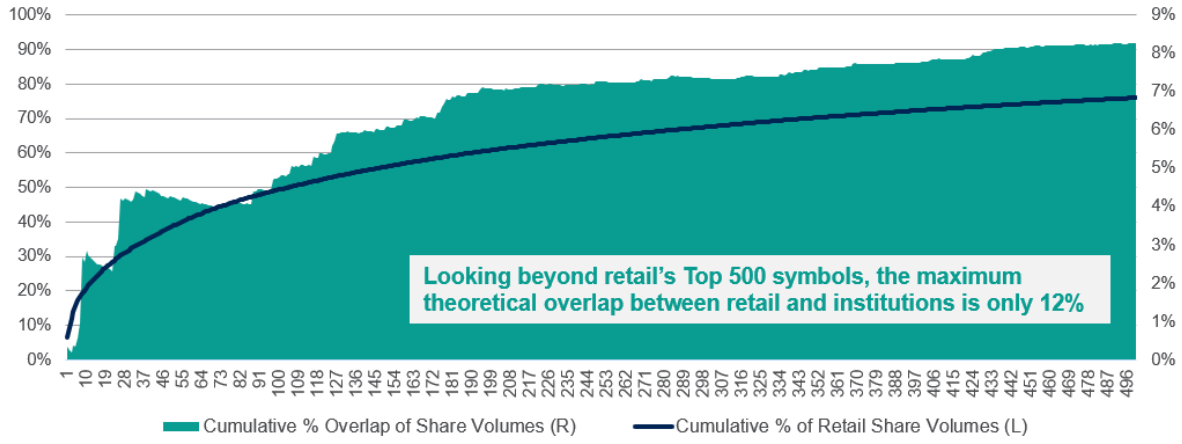
152 Proposed Rule, *supra* note 2, at 208.

153 Peirce Dissent, *supra* note 130.

Institutional and Retail Investors Trade Disparate Symbols; 8% Potential Overlap in Top 500 symbols

- **Retail:** The retail volume that Virtu handles accounts for about 5% of Total Consolidated Volumes (TCV) in U.S. equities. The Top 500 symbols traded by retail account for 76% of this retail volume.
- **Institutional:** Virtu's Peer Database product includes all trades from 180 large buy-side asset managers, including ~75% of the largest 50 global asset managers.
- Comparing the Retail and Institutional trade activity shows a maximum theoretical overlap between Retail and Institutional volume **8% for the Top 500 symbols**[1]. Looking beyond retail's Top 500 symbols, the maximum theoretical overlap between retail and institutions is only 12%.

Theoretical Maximum Overlap of Retail and Institutional Trading Volumes
Top 500 Retail Symbols of Volume Traded by Retail, 1Q 2021



[1] 1Q22

Second, as Professor Lewis states, institutional investors are motivated more by position management than earning spreads, and would therefore be sensitive to potential information leakage in the proposed auctions, as auction messages and confirmations are publicly available.[154] The Commission has not explained how the purported benefit of interacting with small-sized retail orders would outweigh the impact of information leakage on the institutional investors' costs.[155] A respected commentator from T. Rowe Price recently observed that the Commission "can't force people, obviously, to just go to lit markets, because that would stifle competition, but they can certainly put a lot of rules in place that make it less attractive to trade off-exchange. I think these proposals are overly complicated, overly prescriptive . . . they are basically telling people how to trade. [The SEC] ignores potential impacts to firms like ours, where we're trying to trade in larger size."[156]

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[154] Ex. A at 22–23 (Section III.B.3). Furthermore, because the Commission contemplates institutional investors will get priority from non-broker dealers when interacting with segmented orders, those orders will need to be labeled as such publicly. *See* Proposed Rule, *supra* note 2, at 321.

[155] Ex. A, at 22–23.

[156] Kirkel, *supra* note 91 (quoting Mehmet Kinak, T.Rowe Price Global Head of Systematic Trading and Market Structure).

Finally, recent evidence suggests that institutional investors have a negative view of the Proposed Rule. In a recent survey, Bloomberg equity market analyst Larry Tabb asked institutional asset managers whether they would seek to participate in retail auctions. The response speaks for itself: "You'd think institutional asset managers would like direct access to retail flow, instead of sourcing it from wholesalers who only spit it out once they've mined it: but they don't. Asked if they wanted retail order flow to go to exchanges only, auctions or directly to exchanges or alternative trading venues where they could directly bid for it, buyside traders weren't positive on any of these scenarios. Though a net 1% more traders wanted flow to go to exchanges or ATSs, they were overtly negative toward exchanges only and auctions, with a net 26% unfavorable view of each."[157]

The notion that institutional investors will fill the void left by wholesalers is one of the key assumptions on which the Commission's economic analysis is based, but no support is offered for this dubious assertion. The Proposed Rule is therefore defective in its failure to substantiate this key assumption with data or other persuasive evidence.

D. The SEC's Analysis of Potential Transaction Cost Savings is Flawed

The Commission estimates that auctions "***could potentially*** result in a total average annual savings in individual investor transaction costs ranging from $1.12 billion to $2.35 billion."[158] As an initial matter, the SEC fails to even note whether these figures represent a gross or net savings. But in any event, this analysis is flawed because the outcome is entirely speculative. The Commission itself acknowledges significant uncertainty about the estimates because it cannot predict how different market participants will adjust their practices in response to this rule.

The estimates account only for potential changes in individual order transaction costs and assume without basis that (1) the payment for order flow wholesalers currently pay to retail brokers would be converted into additional price improvement for individual investor orders, and (2) retail brokers will continue not to charge commissions on trading.[159] The SEC also fails to consider how diverting institutional investor trading from other market centers, such as ATSs, to qualified auctions may impact the cost of trading on other market centers. If, as the Commission predicts, institutional investors do participate in qualified auctions, there will be less liquidity on other market centers, such as ATSs, resulting in less liquidity at those market centers. This reduction in liquidity may lead to trading costs to investors who continue to trade at those market centers. Similarly, a non-trivial portion of marketable order flow routed to wholesalers is not internalized but is executed against liquidity on other market centers. To the extent that retail order flow is channeled away from other market centers, this would result in greater adverse selection, reduced liquidity, and inferior execution quality on the other market centers.

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157 Larry Tabb, Bloomberg, *US Equity Trading 2023: Innovation/Market Structure* (Feb. 13, 2023).

158 Proposed Rule, *supra* note 2, at 182 (emphasis added).

159 *See* Kothari et al., *supra* note 19, at 1–2 (explaining why off-exchange venues are able to eliminate trading commissions under the existing system).

E. The Commission's Assumption of Frequently Available Midpoint Liquidity is Flawed and Based on Non-Public Data

A fundamental assumption underlying the Proposed Rule is that there is available liquidity at the midpoint that brokers regularly fail to find. But, as Professor Lewis highlights, the Commission's highly generalized and theoretical description of midpoint liquidity suggests that it failed to consider and control for certain factors that constrain how orders are executed, thereby greatly overstating the availability of midpoint execution, and the purported benefits of the Proposed Rule.[160] For example, failure to control for order sized constraints – such as high minimum order quantities, which often prevent resting midpoint orders from executing with retail trades (if those trades were not sufficiently large) – would greatly overstate the availability of hidden liquidity.[161] Furthermore, even when there is some accessible midpoint liquidity, a failure to realize it is not necessarily evidence of failed best execution by brokers.[162] It could, instead, reflect the trade-off between price improvement and execution delay.[163] The Commission fails to take such factors and possibilities into account.

It is also notable that the SEC's midpoint liquidity analysis is based on the Commission's internal analysis of non-public data from the Consolidated Audit Trail ("CAT").[164] Because this data is non-public, it is impossible for investors, market participants, or other commentators to assess the reliability of the Commission's analysis or to verify the accuracy of the results. This is yet another violation of the Commission's obligations under the Exchange Act and stands in stark contrast to the process that the agency followed in its adoption of Regulation NMS, where it prepared "several studies of relevant trading data to help evaluate and respond to the views of commenters."[165] Here, there is no capacity to verify the SEC's work.

Notably, on February 8, 2023, SIFMA submitted a request seeking the CAT data the SEC relied on in an anonymized format.[166] Virtu filed a letter in support on February 24, 2023[167] urging the Commission to publicly release anonymized subsets of CAT data used for the proposals' economic analyses, to identify specific broker-dealers whose Rule 605 and 606 reports were used in the Commission's analyses so they can be replicated and evaluated, and to extend the comment period for the four proposals after release of the requested data. We strongly agree with SIFMA's observation that the task of analyzing the equity market structure proposals "has been further hindered by the unavailability of most of the data upon which the Commission relied in making

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160 *See* Ex. A at 15–16 (Section III.B.1).

161 *See id*. at 15.

162 *See id*. at 17.

163 *See id*.

164 *See id*. at 14, 17.

165 Regulation NMS Final 2005 Rule, *supra* note 5, at 9.

166 SIFMA, Letter to SEC (Feb. 8, 2023), *available at* https://www.sec.gov/comments/s7-31-22/s73122-20156863-325026.pdf.

167 Virtu, Letter to SEC (Feb. 24, 2023), *available at*, https://www.sec.gov/comments/s7-32-22/s73222-20158066-326100.pdf.

the Proposals."[168] Based on our own experience seeking information from the Commission to aid in the evaluation of rulemaking proposals, we are skeptical that responsive data will be forthcoming. [169] Indeed, the Commission has not made the data available by the March 31, 2023 comment letter deadline or yet extended the comment letter deadline.

F. The SEC's Interpretation of Realized Spreads is Flawed

The SEC justifies the Proposed Rule by claiming that marketable orders executed on exchanges have lower realized spreads than those executed by wholesalers. Indeed, the SEC claims that orders executed on exchanges even have negative realized spreads. Based on this analysis, the SEC concludes that the price improvement for retail orders could be significantly improved by routing orders to auctions since the realized spreads on these orders would somehow be equivalent to the realized spreads observed on exchanges.[170] But the SEC's analysis is flawed because it inappropriately compares realized spreads for different types of orders and from different types of liquidity providers with different motivation for providing liquidity.

First, the SEC erroneously assumes that "[r]ealized spreads are a proxy for the potential economic profit that liquidity suppliers may earn on a trade."[171] But for wholesalers, realized spreads are not a proxy for profitability, as Professor Lewis has explained, because they ignore inputs that impact profitability, such as inventory holding costs, fixed costs, and transaction rebates and fees.[172] As Commissioner Uyeda recognized, for wholesalers, the "[r]ealized spreads merely reflect the revenue received . . . on the trade after adjusting for adverse selection risk" whereas economic profit "must also account for the costs of the business." He further stated that "[E]xchanges and wholesale market makers are in fundamentally different businesses and their cost structures are not the same."[173] While time-consuming, the SEC could have performed a more accurate measure of profits given its access to CAT data, but it did not, or it chose not to, include that analysis in the Proposal. Realized spreads simply do not provide the information needed to determine profitability, and therefore the SEC's reliance on them as a proxy for trading profits is highly speculative.

Second, the negative realized spreads that the Commission observes on exchanges suggest the presence of non-market maker liquidity providers. Non-market maker liquidity providers have longer-term trading horizons, making realized spreads an irrelevant measure of profitability or transaction costs. While liquidity may be "cheaper" on exchanges, there is no basis for assuming that these liquidity providers are motivated by realized spreads or that realized spreads play a role in the decisions non-market maker liquidity providers make regarding how and where they will provide liquidity. In short, a non-market maker liquidity provider has a very different motivation in providing liquidity to the markets than a market maker. Thus, the SEC has no basis for

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168 *See* SIFMA Letter, *supra* note 166, at 1.

169 *See supra* note 90.

170 *See* Ex. A at 18–19 (Section III.B.2).

171 *See* Proposed Rule, *supra* note 2, at 212.

172 Ex. A at 19 (Section III.B.2).

173 Uyeda Dissent, *supra* note 116.

comparing exchange-realized spreads and wholesaler-realized spreads. Dyhrberg et al. cautioned against making a comparison between non-market maker and wholesaler realized spreads: "[N]onmarket makers['s] main goal is to manage positions rather than earn spread revenue. The realized spreads that non-market makers earn are therefore not reflective of market making costs and profits. Since non-market makers' share of exchange liquidity provision is significant, caution should be used when comparing exchange realized spreads to wholesaler realized spreads."[174] It is indeed possible that market makers on exchanges earn a comparable or even higher realized spread than wholesalers, even considering differences in adverse selection risks.

Third, the Commission conflates market orders and marketable limit orders in performing its analysis and concluding that realized spreads are higher for retail customers. Specifically, the Commission acknowledges that market orders are a more reliable proxy to determine orders from individual investors (*i.e.*, retail orders) and that limit orders typically represent orders of other market participants.[175] Solely looking at market orders, therefore, would provide a better proxy for segmented orders. Yet, as Professor Lewis recognizes, the Commission then combines market orders with marketable limit orders for purposes of its analysis. If market orders are examined alone (*i.e.*, without marketable limit orders), Table 5 indicates that realized spreads are higher on exchanges relative to wholesalers (2.40 for exchanges and 0.39 for wholesalers).[176] But the Commission bases its forgone price improvement estimate on a weighted average of all marketable orders – both market orders and marketable limit orders – despite the fact that the proportions of marketable orders are not similar and the different nature of the order flow on- and off-exchange.[177]

Moreover, the Commission acknowledges that 79% of dollar volume in marketable flow from retail orders comes from pure market orders.[178] It is only when the Commission combines marketable limit orders with market orders (*i.e.*, combining non-retail orders with retail orders), that the Commission is able to arrive at its conclusion that realized spreads are higher for wholesaler executions relative to exchanges.[179]

Finally, and crucially, the Commission's analysis of realized spreads relies on Rule 605 reports.[180] But in its pending proposal to update Rule 605, the Commission itself acknowledges that Rule 605 reports are inadequate and need to be revised to yield more useful information, and it proposes a new way to calculate realized spreads. The Commission does not explain why its understanding of realized spreads, or its analysis as a general matter, based on existing Rule 605

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174 Dyhrberg et al., *supra* note 18, at 13.

175 Proposed Rule, *supra* note 2, at 212 ("Additionally, the results in Table 5 show that approximately 79% of the executed dollar volume in marketable orders handled by wholesalers are market orders. The Commission believes that these outcomes reflect the heavy utilization of market orders for NMS stocks by individual investors whose orders are primarily handled by wholesalers, contrary to the heavy utilization of limit orders by other market participants.").

176 *Id.* at 214; Ex. A at 21 (Section III.B.2).

177 *Id.*

178 *Id.*

179 *See* Ex. A at 19 (Section III.B.2).

180 *See supra* pages 5,12–13 for discussion about Rule 605 report shortcomings.

reports is reliable – much less how reliance on these deficient reports can justify a far-reaching rule such as this one.

G. The SEC Has Not Considered All the Economic Effects and Equilibrium Responses to the Proposed Rule: There Are a Series of Predictable Outcomes That Would Result in Less Competitive and Less Efficient Markets

Any rule change that fundamentally alters how and where trades can be routed will affect the routing decisions of all market participants, including institutional and retail investors, broker-dealers, and market makers, among others. For example:

- The mandated structure of the auction – which requires retail order flow to be announced publicly prior to execution and auctions cannot be shorter than 100 milliseconds – would allow liquidity providers to fade their quotes, would allow arbitrageurs to trade ahead of retail order flow, and would create an informational disadvantage to retail investors.[181]

- Retail investors also could be affected if an auction fails regardless of whether the auction fails due to lack of interest or from the NBBO moving during the auction period. In this case, retail orders might be routed to exchanges or ATSs to be executed against resting order books(s) and, therefore, they would receive even worse execution as they would be exposed to wider quoted spreads and may be required to trade with multiple price levels to obtain sufficient liquidity to fill the order size.

- Retail orders routed to qualified auctions are likely to be systematically harmed in episodes of correlated order flow or high volatility. Since there would be fewer natural liquidity providers, liquidity would likely be scarce, and auctions would be more likely to fail. A failed auction would further reduce liquidity because it would signal to the market that no one was willing to provide liquidity in the auction. Accordingly, wholesalers handling these orders would be less incentivized to internalize them. Instead, these orders may get routed to exchanges with greater adverse selection where the quoted spreads would be wider and may be executed without receiving any price or size improvement, worsening the execution quality of retail investors.

- Qualified auctions may negatively affect exchange limit order books and market centers that do not host auctions. Under the current market structure, wholesalers route part of their retail order flow to exchanges and ATSs. Suppose that all retail flow under $200,000 is diverted to auctions as proposed under the Order Competition Rule. In that case, fewer retail orders would interact with the limit order books of exchanges or at any market centers where retail flow is currently sent. The remaining order flow on those market centers would have a higher proportion of institutional orders with greater adverse selection risk. Exchange market makers now facing higher adverse selection would increase quoted spreads, leading to wider quoted spreads on exchanges.[182]

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[181] *See* Ex. A at 23–24 (Section III.B.4).

[182] Ex. A. at 24–25 (III.B.4).

H. The Proposed Rule Ignores the High Degree of Operational Risk Introduced by 7 to 22 Million Retail Auctions per Day

As described above, the Proposed Rule fails to devote any discussion to the technological readiness of the exchanges to assume the central role of running an auction regime. This new and completely untested approach would amplify the volume of trades and messages processed by exchanges, with Virtu estimating that the exchanges will handle anywhere from 7 million to 22 million auctions per day.[183] The Proposed Rule fails to include any discussion of whether the exchanges are in a position to undertake this role from a technological perspective, including whether they have the resources to completely overhaul the technological infrastructure for accepting such a high volume of trades from other market participants.

As discussed above, the new auction system would increase the volume of trades processed on exchanges, testing the technological infrastructure for processing and accepting trades from other market participants. As illustrated by the recent NYSE outage on January 24, a technological failure can cause significant loss and disruption to customers, and the Commission has not devoted any discussion to its technological readiness or the risks associated with concentrating so much trading activity at the exchanges.[184] The Proposed Rule is also unclear about whether existing limitations on exchanges' liability, such as SRO immunity, will circumscribe their liability for any issues in the operation of the auctions.

I. If the SEC Believes There Are Not Enough Channels for Natural Liquidity Providers to Directly Interact with and Provide Liquidity to Retail Order Flow, It Could Have Explored Other Cheaper, Less Disruptive, and More Effective Alternatives

The Commission could have investigated more deeply the impediments to the success of the exchanges' existing retail liquidity programs and considered lowering the regulatory barriers to the exchanges finding innovative solutions. For example, the Commission could allow exchanges to have more flexibility in disseminating information about the availability of liquidity in retail programs – as some exchanges have requested.

Similarly, under the current Quote Rule, brokers and ATSs that have midpoint liquidity available are prohibited from communicating the availability of that liquidity selectively to other market participants. The Commission could have considered whether the Quote Rule could be amended to allow certain undisplayed quotes to be made available for retail order flow, subject to strict policies and procedures to safeguard against information leakage.

The Commission also could have considered the possibility of enabling complementary, competing ecosystems – e.g., (i) auctions and (ii) exchanges, and (iii) off-exchange trading – instead of favoring one over the other. The Proposed Rule marks a significant departure from the current design of the national market system, which until now has sought to facilitate but not engineer innovations in market structure – for example, by allowing individual trading market

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[183] *See supra* note 21.

[184] *See supra* Section IV.C.

centers to innovate on their own and compete with each other, without mandating the type of venue or means of execution for equities transactions.

J. The SEC Has Performed Its Economic Analysis in Isolation of Other Interacting Rules, and Therefore It Cannot Determine If any Rule on Its Own Would Be Sufficient to Address Competitive Concerns

It appears that the Commission intends for the Proposed Rule to be adopted or implemented at the same time as three other interrelated rules that (perhaps except for the Rule 605 proposal) each individually represent a substantial and fundamental change to equity market structure. The Commission has also issued, yet not finalized, more than two dozen other proposed rules in the past 18 months, many of which also affect equity market structure.[185] The cumulative, compounding effects of multiple, major changes to the market structure make the need for careful analysis of their intersections indispensable. But the Commission has provided almost no analysis as to how the proposals relate to, or would operate with, each other and the anticipated cumulative effects if more than one proposed rule is adopted. The purported costs, benefits, operational risks, and effects of any one proposed rule are certain to change depending on whether one or more of the other Proposals are adopted. Yet the Commission erroneously considers each rule independently – as if it were the only rule being proposed – using the current market structure as the baseline for each one,[186] and ignoring the possibility that the other rules may alter that baseline or otherwise address the Commission's concerns.[187] As Commissioner Uyeda has elsewhere recognized:

> [T]he Commission proposed—side-by-side—four complex rules with interrelated effects—and did not even attempt to consider the combined impact of those proposals. Far from being an incremental process, where the Commission and other interested persons could learn from experience before proceeding with reforms, the Commission has launched a shock-and-awe approach with the hope that everything falls into place and – more

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[185] For example, the Commission's proposed amendments to the rules governing ATSs would change the definition of an "exchange" under SEC rules. Proposed Rule: Amendments Regarding the Definition of "Exchange" and Alternative Trading Systems (ATSs) That Trade U.S. Treasury and Agency Securities, National Market System (NMS) Stocks, and Other Securities, Release No. 34-94062; File No. S7-02-22 (Jan. 26, 2022), *available at* https://www.sec.gov/rules/proposed/2022/34-94062.pdf. The Proposed Rule fails to even reference that proposal, much less analyze how it would interact with the radical equity market structure changes contemplated in the Proposed Rule. *See* Memorandum from Nicholas Padilla, Jr., Acting Inspector General, to Gary Gensler, Chair of the SEC at 3 (Oct. 13, 2022), *available at* https://www.sec.gov/files/inspector-generals-statement-sec-mgmt-and-perf-challenges-october-2022.pdf (noting SEC managers' concerns that the "more aggressive [regulatory] agenda—particularly as it relates to high-profile rules that significantly impact external stakeholders—potentially (1) limits the time available for staff research and analysis, and (2) increases litigation risk.").

[186] Indeed the Commission repurposes portions of the same baseline and economic analysis in both proposals. *Compare, e.g.*, Proposed Rule, *supra* note 2, at 248–253 with Best Ex Rule Release, *supra* note 8, at 206–14.

[187] See Ex. A at 25–27 (Section III.C). SEC, Dec. 14, 2022 Open Meeting Part 01 at 1:08:25 – 1:09:00, *available at* https://www.youtube.com/watch?v=s9gdfxCoIq4 (Commission Division of Trading and Markets Director Zhu states that Commission believes each rule stands "on its own" and delivers its own benefit in response to question whether staff has considered how best execution rule is likely to affect other rules being considered).

importantly – improves on the status quo. Whether that will occur is an open question.[188]

Industry participants have also expressed concern about the Commission's approach; a respected industry participant from T. Rowe Price recently observed: "We have to look at them in totality, but when we do that, there's so many layers to what the SEC proposed that it's difficult to understand and appreciate whether or not it would actually be beneficial to the marketplace."[189] In sum, understanding these intersections and the interoperability of the proposals is critical to ensuring that each of the four rules is necessary to enhance competition. Considering the significant overlap in the goals for the four proposed rules (not to mention the other dozen rules proposed by the Commission) it would seem that if any of the other rules are successful at achieving their stated purpose, competition would be enhanced without the need for this Proposed Rule (and its significant risks and costs) and therefore the claimed benefits of the Proposed Rule are overstated.

Virtu has highlighted just some of the important ways in which the proposals overlap and interact with each other:

1. Rule 605 and Economic Analyses of Other Proposals, Including the Proposed Rule

The economic analyses of each of the proposals rely in part on execution quality reports under Rule 605 of Regulation NMS. However, the SEC acknowledges in the Rule 605 Proposal that the Rule 605 metrics are deficient and in need of enhancements.[190] It is therefore unclear the extent to which the Commission's analyses that use Rule 605 reports under the Tick Size Proposal, Reg Best Ex, and the Proposed Rule are reliable. For instance, the Commission acknowledges in the Rule 605 Proposal that Rule 605 reports would benefit from a size improvement metric. According to the Commission, a size improvement metric in Rule 605 reports would help address market participants' concerns of finding sources of liquidity for larger-sized orders.[191] At the same time, the Commission makes no attempt to evaluate size improvement as part of the Proposed Rule, nor does the Commission even acknowledge that the Rule 605 reports used to support the

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[188] Mark Uyeda, Commissioner, SEC, Statement on Final Rule on Shortening the Securities Transaction Settlement Cycle (Feb. 15, 2023), *available at* https://www.sec.gov/news/statement/uyeda-statement-settlement-cycle-021523#_ftn1.

[189] Kirkel, *supra* note 91 (quoting Mehmet Kinak, T.Rowe Price Global Head of Systematic Trading and Market Structure).

[190] 605 Rule Release, *supra* note 8, at 174 ("[T]he utility of Rule 605 reports has been eroded, which has limited the Rule's ability to address the market failures identified in the Adopting Release [of Rule 605's predecessor in 2000]. . . . [T]he metrics currently required to be reported by Rule 605 are no longer as useful for comparing execution quality across market centers as they were when Rule 605 was adopted, and other metrics that would be useful for this purpose are not currently included in reporting requirements, which limits the current benefits of Rule 605 for promoting competition among market centers and improving execution quality for all types of investors.").

[191] *Id.* at 130 ("The Commission believes that the use of size improvement statistics could help address these concerns by providing users of the statistics with information relating to which market centers and broker-dealers are more likely to be able to fill larger-sized orders at or better than the NBBO.").

Commission's analysis in the Proposed Rule do not contain a size improvement metric and how that might impact its analysis.[192]

Presumably, the SEC envisions that the proposed amendments to Rule 605 will give retail investors more insight into the performance of retail brokers, which will allow retail investors to switch to brokers who provide better execution. If realized, these amendments could increase competition across introducing brokers, and across wholesalers in a manner that improves execution quality without a need for the Proposed Rule (and its significant risks and costs). Indeed, a recent academic study by Professors Battalio and Jennings indicates that proposed changes to Rule 605 may increase reported price improvement by up to 2.75 times currently reported figures.[193] Specifically, under the Rule 605 Proposal, covered orders would be expanded to include non-exempt short sales, odd lots, and (as noted) a size improvement metric. Professors Battalio and Jennings found, based on a review of Rule 605 data and proprietary data provided by one or more wholesalers for the month of May 2022, that when short sales, odd lots, and size improvement are included—as would occur if the Rule 605 Proposal is adopted—price improvement as reported under Rule 605 would increase from $81.2 million to $223.3 million.[194] If it is true that price improvement statistics of wholesalers would increase if the Commission's proposed changes to Rule 605 are adopted, this would matter significantly for the Commission's economic analyses in the Proposed Rule and other proposed rules.

We recommend that the Commission amend Rule 605 to provide more comprehensive execution quality statistics on retail activity based on input from investors and market participants, and then pause to study and assess market quality based on the newly collected data before determining whether to move forward with the other proposed rules.

2. The Proposed Rule and Reg Best Ex

In reading the Proposed Rule and Reg Best Ex together, it appears that the Commission's general expectation with respect to segmented orders is that a broker-dealer should first route such order to try to access midpoint or better liquidity at various venues before routing a segmented order to a qualified auction (for purposes of this letter, "Midpoint before Auction Routing"). But that is not made clear in the two proposed rules. To the extent that Midpoint before Auction Routing is how the Commission views these two proposals operating together as a plain reading

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[192] While the Commission appears to have tried to mitigate some of the limitations of using Rule 605 data by supplementing its analyses with CAT data, the Commission does not appear to have tried to use CAT data to evaluate size improvement under the OCR. As noted, CAT data are also not available to the public and cannot therefore be evaluated by the public in its review and consideration of the Proposals.

[193] Battalio & Jennings, *supra* note 18, at 19 ("Together, fully internalized and fully externalized orders adjusting for size improvement, odd lots, and short sells increases the Rule 605 defined price improvement from $81.2 million to $223.3 million, a 2.75-fold increase."). Professors Battalio and Jennings note that depending on how size improvement is calculated, the amount of price improvement is as high as $388 million for May 2022, which would be a five-fold increase. *Id.* n.25.

[194] *Id.*

of the two proposals would suggest, this should be made explicitly clear in the Proposals.[195] In addition, if Midpoint before Auction Routing is the approach, the Commission should consider the following implications of adopting both the Proposed Rule and Reg Best Ex:

- Segmented orders in qualified auctions would largely reflect undesirable trades, which are unlikely to receive an execution in a qualified auction.

- Certain counterparties may be precluded from participating in the qualified auctions under the Proposed Rule, which prohibits broker-dealers with knowledge of where a segmented order is to be routed from submitting an order that could take priority.

- Liquidity providers willing to provide midpoint or better executions may only wish to trade with segmented orders from originating broker-dealers whom they know, and therefore the originating broker-dealer may face a choice between revealing its identity to a liquidity provider that may provide the best possible execution consistent with Reg Best Ex or the risk that its identity may be made known to all market participants in a qualified auction (potentially to the detriment of its customer) if it first seeks liquidity from that dealer.

- An originating broker must "pick its poison" by either risking potential information leakage from seeking potential liquidity away from a qualified auction to promote compliance with best execution obligations or instead risk information leakage through the qualified auction itself under the OCR.

- A broker-dealer's best execution responsibilities under proposed Reg Best Ex require consideration of potential delays in execution that could result in worse prices. This could further encourage broker-dealers to seek midpoint or better liquidity on different venues before routing to a qualified auction because of the delays associated with receiving an execution in a qualified auction. The Commission failed to consider the costs of these delays in its proposal.

3. The Proposed Rule, Best Ex, and Rule 605 Proposal

Under the Rule 605 Proposal, the Commission would require broker-dealers that introduce or carry at least 100,000 customer accounts to become subject to reporting under Rule 605. The Commission believes that investors reviewing the Rule 605 reports of these large broker-dealers could better evaluate broker-dealers' handling of their orders and the increased competition could "lead to faster executions, better price improvement, and a shift in order flow to those broker-dealers offering the best execution quality for their customers."[196]

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[195] To the extent that this is not the Commission's expectation of how these two proposals should be read together, this needs to be clarified and market participants need to be provided with an opportunity to comment on what the Commission's expectations actually are.

[196] 605 Rule Release, *supra* note 8, at 43.

This raises several important issues, including investor confusion in particular, with respect to how Rule 605 reports are evaluated:

- The time-to-execution metric is very likely to be skewed because of the requirement to route segmented orders to a qualified auction under the Proposed Rule as well as any expectations of Midpoint before Auction Routing under Reg Best Ex. The intersection of these three proposals creates conflicting incentives for broker-dealers in making routing determinations, none of which have been discussed by the Commission. Specifically, a broker-dealer is incentivized to take the chance of seeking midpoint or better liquidity because if it does so, it will have vastly greater time-to-execution metrics and will have obtained a favorable price for its order. At the same time, because midpoint liquidity is not displayed, there is no certainty that midpoint liquidity will be found, which will result in the worst outcome in terms of the time-to-execution metric. And, while the middle path of routing directly to a qualified auction strikes a balance between these two choices, the broker-dealer would be at risk for not having sought potential midpoint liquidity prior to routing to the qualified auction and at risk to NBBO moves against the order during the auction period.

- One of the key purposes of the Rule 605 Proposal is to provide retail investors with more transparency to allow them to make informed decisions about the best broker-dealer to use, but the Proposed Rule and Reg Best Ex appear to restrict investors choice by dictating market structure outcomes by imposing requirements that will reduce market competition. The mandated routing to qualified auctions is particularly problematic because the execution quality received from the qualified auction will be largely out of the control of the broker-dealer. Consequently, Rule 605 reports for large broker-dealers may not accurately reflect the overall execution quality and reliability of a broker-dealer for segmented orders. The Commission has not discussed or considered the costs and benefits in any of these three proposals of the implications of holding broker-dealers to account for execution quality that they cannot control, or how Rule 605 reports could be modified to mitigate these concerns – such as through investor education, excluding segmented orders, separately categorizing segmented orders, or adjusting time-to-execution metrics.

4. The Proposed Rule and the Tick Size Rule

As noted in SIFMA's February 8, 2023 comment letter, the changes to tick sizes the Commission has put forth in its Tick Size Proposal would significantly impact all the calculations the Commission used in its economic analysis to support the Proposed Rule.[197] That is, both the economic baseline and the estimated economic effects described by the Commission are based on the assumption of a market structure in which trades occur in full penny increments. In other words, the Commission believes that, if the Tick Size Proposal were implemented, realized spreads would narrow for most stocks; however, at the same time, the Commission estimates that retail investors could receive an additional $1.5 billion in price improvement under the Proposed Rule based in large measure on the Commission's analysis of realized spreads today. Therefore, if both proposals are implemented, then realized spreads would be reduced under the Tick Size Proposal

[197] SIFMA Letter, *supra* note 166, at 3.

and the Commission's estimate of the $1.5 billion shortfall would need to be adjusted accordingly to properly reflect any incremental benefit from mandating auctions.[198] The Commission has performed no calculations that consider this critical interplay, or even acknowledged this interrelationship.

In addition, the Tick Size Proposal also purports to level the playing field between exchanges and ATSs relative to wholesalers through harmonizing quoting and trading increments by better facilitating exchanges' ability to execute orders in sub-penny increments.[199] At the same time, the Commission makes clear that the Proposed Rule "would likely cause wholesalers and some retail brokers to incur significant adjustment costs to their operations, as well as a possible decline in profitability."[200] It is unclear whether the Commission's view is that the Proposed Rule and the Tick Size Proposal *together* would level the playing field between wholesalers and exchanges, or if the Tick Size Proposal would, on its own, level the playing field. If the Tick Size Proposal would level the playing field independent of the Proposed Rule and the Proposed Rule would likely cause a decline in profitability to wholesalers and significant adjustments to their business structures, it begs the question of whether the Commission's new market structure would create an *uneven* playing field in favor of exchanges and ATSs.

Similarly, the Tick Size Proposal also proposes to harmonize quoting and trading increments (*i.e.*, by prohibiting effecting trades in an increment other than the new approved quoting tick size for the security) for the stated purpose of leveling the playing field between market centers. At the same time, under the Proposed Rule, qualified auctions would operate with a trading increment of $0.001 for all segmented orders, even where the stock may have a tick size other than $0.001 (*i.e.*, $0.002, $0.005, or $0.01). As a result, the two proposals together would create an *unlevel* playing field for market centers, which is the exact opposite of the stated goal of the Tick Size Proposal.[201]

K. The Proposed Rule Also Fails to Address Various Practical and Operational Matters

Given the scope of the potential impact of the newly established auction system, the Commission has failed adequately to address or describe certain questions or deficiencies in its operational design and the resultant costs. In particular:

- The Commission does not explain what should happen when there is a change in an NBBO while a qualified auction is in process—*i.e.*, should it be cancelled or allowed

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198 There are additional significant questions around the Commission's competitive shortfall estimate, including that it fails to account for exchange fees and that the estimate assumes that the competitive shortfall would be "on top of" rather than "instead of" the price improvement currently received.

199 Tick Size Rule Release, *supra* note 8, at 258 ("This coupled with the fact that OTC market makers would be restricted to the same minimum trading increment as exchanges and ATSs would help level the competitive playing field between exchanges/ATSs and off-exchange dealers when it comes to attracting retail order flow.").

200 Proposed Rule, *supra* note 2, at 183.

201 For example, under the Tick Size Proposal, *supra* note 8, a stock with a tick size of $0.005 could generally only trade OTC in increments of $0.005, which is the same increment at which it could quote and trade on exchanges. However, that same order executing in an exchange's qualified auction could trade in increments of $0.001.

to continue? Nor does it account for the negative impact of such delays on order execution.

- The Commission intentionally leaves open the question of whether an "open competition trading center" can simultaneously operate multiple qualified auctions for the same stock.[202] Whether auctions are performed concurrently or simultaneously bears directly on investors' ability to realize price improvement and should be addressed at the outset.

- The Commission does not address the obligations and costs now imposed on foreign market participants, who are simultaneously subject to different requirements in their home jurisdictions, and the possible disincentives this might create to their participation on U.S. markets.

VII. The Proposal Ignores Other Paths to Enhancing the Market, Including Disclosure Changes, That Do Not Risk Harm to Our Capital Markets or Investors

When an agency promulgates a rule, it must do more than provide a "detailed justification" for its decision (which the Commission failed to do here). It must also guard against regulatory instability by first considering reasonable "alternatives . . . within the ambit of the existing policy."[203] Here, the Commission did not consider any of the viable alternatives that were proposed by commenters and members of the Commission.

For all of the reasons described above, we respectfully submit that the Commission should abandon the Proposed Rule and instead consider modest, tailored enhancements to its rule set instead of the dramatic reforms that have the potential to severely harm investors and market participants. In particular, the Proposed Rule, in its current form, threatens the broad availability of commission-free trading, the speed and quality of trade execution, and the significant real price improvement currently associated with retail orders. Below are suggested alternatives that we believe are thoughtful, data-driven regulatory enhancements that the Commission should consider pursuing.

A. Enhance Execution Quality Metrics on Trade Confirms

Virtu supports requiring disclosure of comprehensive detail about order execution quality to retail investors on their individual trade confirmations. Providing such detail on an order-by-order basis would arm retail investors with a wider array of data to make individual decisions about where they send their orders to obtain the best executions. Such a requirement would also benefit retail investors by incentivizing brokers to route orders, and market centers to execute orders, on the terms that are most favorable to individual investors.

First, the Commission should mandate that brokers report the amount of price improvement (if any) that a customer receives on each individual trade. Relatedly, the

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[202] *See* Proposed Rule, *supra* note 2, at 122.

[203] *DHS* v. *Regents of Univ. of Cal.*, 140 S. Ct. 1891, 1913 (2020) (internal quotation marks omitted); *see Chamber of Commerce*, 412 F.3d at 144–45 (SEC was required to consider non-frivolous alternatives).

Commission should establish a standardized methodology for market centers to calculate and report price improvement statistics. Currently, market centers have discretion in determining how to calculate price improvement, which can result in an apples-to-oranges comparison of execution quality offered by competing market centers.

Second, the Commission also should mandate that brokers report the amount of size improvement (if any) that a customer receives on each individual trade.

Finally, the Commission should require brokers to report "distance from the midpoint" metrics—*i.e.*, the distance from the midpoint of the market at the time that a customer's order is entered to the execution price the customer actually receives. We believe that disclosing to investors that their trade was executed at a price better or worse than the midpoint—and by how much—would be more meaningful to investors in judging the quality of each individual transaction executed by a particular market center than reporting the NBBO that existed at the time of the trade.

These additional disclosures, and the Proposed Rule both address what is primarily a potential principal-agent conflict between broker-dealers and wholesalers. However, the Proposed Rule suggests a roundabout and ill-fitting solution to this potential conflict—imposing equity trading price controls. The current market system already accounts for and provides solutions to this potential principal-agent conflict through disclosure of execution metrics. Expanding and improving such disclosure will improve the capacity for a broker-dealer (the principal) unsatisfied with the execution it receives from a wholesaler (the agent), to choose another wholesaler to replace their current wholesaler. SEC intervention that changes the entire equity trading structure is a wholly inefficient and dangerous alternative to increasing disclosure, which thereby increases broker-dealers' leverage to improve execution quality in a free market.

B. Update the NBBO Benchmark

Virtu supports adopting the proposed changes in the Rule 605 Proposal requiring market participants to report additional execution quality statistics regarding size improvement, and for odd lots, large lots, and other order types. Virtu believes that it would be beneficial to market participants to be able to assess execution quality by comparing the fill prices on their orders to a reference benchmark that includes all displayed liquidity on exchanges, including resting odd lots that are visible in market data feeds.

C. Mandate Uniform PFOF Rates by Broker

In addition, in order to address perceived conflict of interest concerns, we support a requirement that the PFOF rates charged by a broker be uniform for all market centers to which the broker routes order flow. Currently, in practice, all brokers charge uniform rates for PFOF to each market center they route to, but we agree that mandating this practice by rule is a timely and appropriate reform that would squarely address concerns related to potential conflicts of interest in a broker's order routing decisions.

D. Explore Enhancing Retail Liquidity Programs

As the NYSE has offered in its comment letter on the four proposed rules, the Commission could also have pursued its goals by exploring innovations or enhancements to existing retail liquidity programs, which are viewed as close analogues to its proposed auctions, and where participation has been minimal.[204] The Commission could consider enabling complementary liquidity sources to interact more with retail by allowing them to display quotes at sub-penny increments. This would enable wholesalers to route to them more frequently. These displayed sub-penny quotes would be unprotected but the wholesalers would be expected to interact with them before internalizing at less favorable prices. This would address: (i) the criticism that "retail is inaccessible" by making it accessible to anyone who wants to quote on an RLP venue; (ii) the criticism of an "unlevel playing field" by allowing exchanges to quote in sub-pennies; and (iii) the criticisms that wholesaling has "too much concentration" and "lacks order-by order competition."

[204] *See supra* Section VI.C; NYSE, Comment Letter at 9 (Mar. 13, 2023), *available at* https://www.sec.gov/comments/s7-31-22/s73122-20159564-327572.pdf.

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As we at Virtu have repeatedly stated, the superior execution quality that retail investors benefit from in today's marketplace is the result of an effective regulatory regime that has served investors and market participants well for decades. Instead of moving forward with the risky experiment contemplated under the Proposed Rule and the suite of equity market structure proposals generally, we urge the Commission instead to begin with the disclosure enhancements in the Commission's Rule 605 proposal and to study the outcomes before proceeding with other reforms. The Commission has a long history of engaging in thoughtful, deliberate, and data-driven regulation – an approach well-suited to a topic as complex as reform of the national market system. Enhancing the nature and scope of data and information required to be reported under Rule 605 will provide the Commission with the information it needs to assess whether there is, in fact, a market failure that needs to be addressed and to consider how the regulatory framework should be altered to enhance the retail investor experience.

Respectfully Submitted,

Douglas A. Cifu
Chief Executive Officer

cc: The Honorable Gary Gensler, Chair
The Honorable Hester M. Peirce, Commissioner
The Honorable Caroline A. Crenshaw, Commissioner
The Honorable Mark T. Uyeda, Commissioner
The Honorable Jaime E. Lizarraga, Commissioner
Dr. Haoxiang Zhu, Director, Division of Trading and Markets

Exhibit A

The SEC's Proposed Rules for Equity Market Structure

Craig Lewis, Ph.D.*

March 28, 2023

* I am the Madison S. Wigginton Professor of Finance and Professor of Law at Vanderbilt University. From June 2011 to May 2014, I was Chief Economist and Director of the Division of Economic and Risk Analysis at the U.S. Securities and Exchange Commission. Virtu Financial, Inc. ("Virtu") provided financial support and access to its data in connection with this research.

Table of Contents

I. Introduction and Executive Summary

1. My name is Craig Lewis and I served as the Chief Economist and Director of the Division of Economic and Risk Analysis at the U.S. Securities and Exchange Commission ("SEC" or "the Commission") from June 2011 to May 2014. I received my Ph.D. in finance from the University of Wisconsin and have been a professor at Vanderbilt University since 1986, where I currently serve as the Madison S. Wigginton Professor of Finance. I have spent much of my career researching and analyzing U.S. financial markets and corporate financial policy. During my tenure at the SEC, my office co-authored a memo entitled "Current Guidance on Economic Analysis in SEC Rulemakings,"[1] which articulates the SEC's approach to conducting high-quality economic analysis in rulemakings and is still in effect today.

2. I submit this report which evaluates the package of equity market structure rules proposed by the Commission on December 14th, 2022 ("Proposed Rules"), with a particular focus on the economic analysis presented by the Commission. The rule package encompasses four interconnected proposed rules related to equity market structure: 1) the Order Competition Rule ("Order Competition Rule Proposal"),[2] which would require certain orders from individual investors to be subjected to a "qualified auction" before they can be internalized; 2) Regulation Best Execution ("Best Ex Rule Proposal"),[3] which would set forth a new best execution regime, in addition to the current regime administered by the Financial Industry Regulatory Authority ("FINRA") and Municipal Securities Rulemaking Board ("MSRB"); 3) Regulation NMS: Minimum Pricing Increments, Access Fees, and Transparency of Better Priced Orders ("Tick Size Rule Proposal"),[4] which would establish variable minimum pricing increments and reduced access fee caps; and 4) Disclosure of Order Execution Information ("605 Rule Proposal"),[5]

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[1] Memorandum Re: "Current Guidance on Economic Analysis in SEC Rulemakings," Division of Risk, Strategy and Financial Innovation (RSFI) and the Office of the General Counsel (OGC), Securities and Exchange Commission, March 16, 2012, available at https://www.sec.gov/divisions/riskfin/rsfi_guidance_econ_analy_secrulemaking.pdf ("Guidance").
[2] See "Order Competition Rule," Release No. 34-96495; File No. S7-31-22, Securities and Exchange Commission, December 14, 2022 ("Order Competition Rule Release").
[3] See "Regulation Best Execution," Release No. 34-96496; File No. S7-32-22, Securities and Exchange Commission, December 14, 2022 ("Best Ex Rule Release"). Note, this rule proposal is applicable to fixed income and crypto asset securities as well. This report does not address these other asset classes.
[4] See "Regulation NMS: Minimum Pricing Increments, Access Fees, and Transparency of Better Priced Orders," Release No. 34-96494; File No. S7-30-22, Securities and Exchange Commission, December 14, 2022 ("Tick Size Rule Release").
[5] See "Disclosure of Order Execution Information," Release No. 34-96493; File No. S7-29-22, Securities and Exchange Commission, December 14, 2022 ("605 Rule Release").

which would update the disclosure requirement for NMS stock order executions under Rule 605. All four proposed rules are based on the unsupported premise that the current system is insufficiently competitive and does not serve retail investors well. However, the Commission needs to provide a compelling economic justification for its rules individually and collectively, and therefore it needs to clarify how the package of rules will effectively promote efficiency and competition in the equity markets.

3. Historically, the Commission has taken a deliberate approach to additional rulemaking that considers the needs and concerns of both institutional and retail investors as it seeks to satisfy its mandate to protect investors and maintain fair, orderly, and efficient markets.[6] Noteworthy milestones include the deregulation of commissions and the development of consolidated dissemination of quotes and trades in the 1970s, the order handling rules in the 1990s, Regulation ATS in 1998, execution quality and order routing disclosures in the 2000s, decimalization in 2001, and Regulation NMS in 2005.[7] Since 2005, the regulatory framework has continued to evolve, enhancing market stability and improving investor experience.[8]

4. While the Commission should always seek and consider opportunities to enhance the markets, there is not a sound basis for a concern that retail investors are not well served in today's markets. The broad market consensus from retail brokers, wholesalers, buy-side, and exchanges, summarized by numerous market representatives at the SIFMA Equity Market Structure Roundtable held on September 13, 2022,[9] is that market quality for retail investors is very good and that drastic changes, such as those proposed, are not needed. There is also abundant academic research and empirical analysis that supports the view that the current system serves retail investors well.

5. The Commission presents new economic analyses in the proposing releases. For example, the so-called "Competitive Shortfall Analysis" purports to find evidence that the price improvement currently provided for retail orders could be much more significant. However, as

[6] The Commission's mandate also includes facilitating capital formation.
[7] See "The Commission Rate Issue," September 12, 1973; Release No. 14415, January 26, 1978; 43 FR 4342, February 1, 1978; Release No. 34-37619A, September 6, 1996; Release No. 34-40760, December 8, 1998; Release No. 34-43590, November 17, 2000; "Commission Notice: Decimals Implementation Plan for the Equities and Options Markets Exchange Committee on Decimals," July 24, 2000; Release No. 34-51808, June 9, 2005.
[8] See Release No. 34-61595, February 26, 2010; Release No. 34-67457, July 18, 2012; Release No. 34-73639, November 19, 2014; Release No. 34-80295, March 22, 2017; Release No. 34-83663, July 18, 2018.
[9] See "SIFMA Equity Market Structure Roundtable," *SIFMA*, September 13, 2022, available at https://events.sifma.org/equity-market-structure-roundtable.

explained in this report, this is an unsupported interpretation of an established and well-documented phenomenon, and the Commission has not demonstrated that the Proposed Rules would indeed provide such price improvement. Likewise, another one of the Commission's analyses purports to find large amounts of untapped liquidity at the midpoint when retail orders are being executed at less favorable prices, but for reasons explained below, this analysis has significant flaws and cannot be relied upon.

6. From a procedural standpoint, four simultaneous rules designed to address the same concern from different directions, and without a pilot, are unlikely to be an efficient or responsible policy-making approach. While economic analysis is always an essential part of the rulemaking process, it is even more crucial when simultaneous rule proposals interact using different approaches to address the same "problem."

7. The market has evolved in a way that works very well for retail and institutional investors alike. Under the current structure, wholesalers, a particular type of off-exchange market maker, play a central role in helping retail orders get high-quality executions. A clear understanding of the role wholesalers play is crucial to evaluating whether the Proposed Rules are more likely to help or hurt execution quality for retail investors. In particular, such an understanding is necessary to fully consider the economic effects of the Order Competition Rule Proposal, which would represent a radical change in how retail order flow is handled.

8. A summary of the findings in this report are as follows:

   a. Today's markets are highly efficient, particularly for retail investors, based on narrower quoted and effective spreads, significant price improvement, and faster execution speeds that are largely provided by wholesalers, who provide price improvement (including midpoint executions or better on over 44% of shares),[10] size improvement, and guaranteed executions of illiquid stocks. Wholesalers compete by providing high-quality executions, and retail brokers enforce competition by rewarding wholesalers who provide better execution quality with more order flow.

   b. The Commission proposes four separate rules designed to achieve the same overarching objectives, but contrary to its published guidance, the Commission does not justify why all four rules are necessary, neither individually nor in combination, and

[10] Order Competition Rule Release, Table 7.

instead evaluates each rule independently, ignoring the possibility that the other three rules in their individual capacity may already address the Commission's concerns. For this reason alone, the economic analysis in the Proposed Rules should be considered arbitrary and capricious.

c. The highly interconnected rules overlap in their intended benefits, but the costs tend to be orthogonal. Without a more robust analysis of the interaction effects of these complex rules, the Commission is unable to properly weigh the benefits of any given rule against its costs nor identify the least costly and least disruptive way to implement its rules.

d. The Commission presents an analysis of available non-displayed midpoint liquidity as support for its proposed Best Ex and Order Competition Rule Proposals. However, the Commission's analysis appears flawed as it ignores the economic reasons why this liquidity may not be accessible to retail investors and that some degree of "ignored" liquidity is not evidence of a failure of best execution. The Commission provides no guidance for how brokers should assess the various trade-offs in providing best execution in the new regime, such as how long an execution should reasonably be delayed in the search for higher levels of price improvement.

e. The Commission presents another analysis that compares realized spreads between exchanges and wholesalers to support its claim that qualified auctions would improve pricing for retail investors. However, its analysis needs to be reconsidered because it inappropriately compares realized spreads from a diverse set of liquidity providers with different motivations for providing liquidity, yielding an unreliable estimate of the proposed benefits under the Order Competition and Best Ex Rule Proposals. Also, without basis, the Commission uses realized spread to infer that institutional liquidity providers would participate in the auctions, ignoring that the retail liquidity programs offered by exchanges have attracted very little liquidity.

f. Additionally, numerous economic reasons suggest that implementing qualified auctions may not incentivize liquidity providers to participate, as some may have concerns about information leakage. Regardless, if liquidity is diverted from other

execution venues, market quality could worsen for retail and institutional investors by increasing adverse selection risk, resulting in wider spreads.

g. The Commission has not fully considered the Proposed Rules' possible unintended negative consequences that could undermine many of the benefits of the existing market structure, such as interfering with the competitive dynamics of wholesalers and retail brokers, which discipline prices and benefit retail investors. If adopted as proposed, the Proposed Rules could reduce or eliminate the significant benefits retail investors currently receive from wholesalers, including guaranteed executions for illiquid stocks, a substantial amount of price improvement including a high rate of midpoint executions, and size improvement. There is little reason to believe that wholesalers would continue to provide these benefits to the same degree they do today if the Order Competition Rule Proposal is adopted, resulting in increased trading costs to retail investors.

h. The 605 Rule Proposal is the least burdensome and costly of the proposed rules and may achieve all or most of the stated goals of the entire rule package. The 605 Rule Proposal also poses the least risk of creating unintended consequences associated with disrupting today's well-functioning market structure. Accordingly, the Commission should consider implementing the 605 Rule Proposal in isolation and then determine whether there is a need for further changes to the equity market structure, which could be implemented in pilot programs and in stages.

i. At its core, the approach taken by the Commission in its four rule proposals is an example of picking winners and losers without providing meaningful justification for its decisions.

II. Perspective on the U.S. Equity Market Structure and Past Regulations

9. A key question raised by the Proposed Rules is whether retail investors would receive better trade execution quality under a new market structure if the proposed rules were adopted. To address this and other questions, one must start with a clear understanding of the current state of equity trading, particularly from the perspective of retail investors. As discussed in this section, today's markets are highly competitive and reflect decades of regular, incremental

regulation by the Commission. Retail investors have benefited significantly from competitive equity markets, supported by a wealth of unambiguous empirical support showing that there has never been a better time to be a retail investor. Relative to prior decades, execution quality has improved while trading costs have decreased, both to a significant degree, and wholesalers have played a crucial role in helping retail investors achieve excellent execution quality and low trading costs.

A. Today's Markets Are Highly Efficient, Particularly for Retail Investors

10. These regulatory changes, coupled with technological advances, have greatly improved the experiences of all investors, and retail investors in particular. As an initial matter, direct trading costs, *i.e.*, trading commissions, have been virtually eliminated for retail investors trading through online platforms. Average commission rates as high as $35 per trade in 2003 fell to about $12 by 2012.[11] At the end of 2019, five major retail brokerages dropped their commission rates to zero in response to competitive pressures,[12] and most brokers currently do not charge commissions.

11. Based on a wide variety of well-documented metrics, it also is clear that execution quality has improved significantly for marketable orders of retail investors. Indicia of these improvements include narrower quoted and effective spreads, more significant price improvement, and faster execution speeds. For example, Angel, Harris, and Spatt (2015) show that the effective spreads of NYSE- and Nasdaq-listed stocks fell by more than 50% from 2002 to 2013.[13] According to a recent study by Modern Market Initiative, for "certain large cap stocks and ETFs," the bid-ask spreads had declined from "a range of 1-3 basis points by the 2010s [… to] about ½ a basis point [by 2020]."[14] The E/Q ratio, which measures the effective spread relative to the quoted spread and provides a normalized assessment of trade execution quality,

[11] James J. Angel, Lawrence E. Harris, and Chester S. Spatt (2015), "Equity Trading in the 21st Century: An Update," *Quarterly Journal of Finance*, Vol. 5, No. 1, Figure 11.
[12] "The Impact of Zero Commissions on Retail Trading and Execution," *Greenwich Associates*, February 25, 2020, available at https://www.greenwich.com/equities/impact-zero-commissions-retail-trading-and-execution.
[13] James J. Angel, Lawrence E. Harris, and Chester S. Spatt (2015), "Equity Trading in the 21st Century: An Update," *Quarterly Journal of Finance*, Vol. 5, No. 1, pp. 5−6. The authors observe effective spreads on NYSE and Nasdaq-listed stocks based on Rule 605 reports. Effective spread is "twice the difference between the actual trade price and the midpoint of the quoted National Best Bid or Offer ('NBBO') at the time of order receipt."
[14] "A Report on Market Automation and Dependable Liquidity in Times of Uncertainty: Investor Savings from Narrowed Bid Ask Spreads, Markets Functioning as Intended," *Modern Markets Initiative*, July 2022, p. 10.

has also improved over the years.[15] A recent white paper by Charles Schwab, which typically routes its marketable retail executions to wholesalers, shows that its average E/Q ratios declined by 67% in the last 15 years.[16] This substantial decrease translates into direct cost savings for retail investors.

12. "Price improvement" is an industry-standard metric that quantifies the quality of a trade execution by measuring the trade price relative to the best available prevailing public quote, as defined by Reg NMS, called the national best bid/offer ("NBBO"). In other words, price improvement quantifies the extent to which retail investors receive more favorable prices than the prevailing best quote on the exchanges. An industry report noted that "[n]early all retail broker-dealers send the overwhelming majority of their 'non-directed' orders—those not designated to go to a specific venue—to wholesale market makers" and estimated that between July 2018 and June 2019 "87% of retail market order shares received price improvement."[17] This report estimated that wholesalers provided $1.3 billion in savings to retail investors in 2018. The largest source of price improvement comes from wholesalers, and it has been increasing over time. Bartlett (2022) shows that the daily percentage of non-exchange trades in Dow stocks receiving price improvement has increased between 2014 and 2020 by as much as 50% for both round and odd lots.[18] Price improvement also can be achieved on exchanges through retail liquidity programs ("RLPs") or when hidden liquidity is available. Besides price improvement, retail investors also benefit from size improvement, which is sometimes referred to as "enhanced liquidity," and is the execution of more shares than the displayed amount at the NBBO quote.[19] Many retail orders exceed the amount of displayed liquidity at the NBBO and receive size improvement—an analysis by Virtu estimates that 45% of retail share volume (54% of retail

[15] The 605 Rule Proposal adds this metric as an update to the execution quality disclosure under Rule 605 of Reg NMS.
[16] "U.S. Equity Market Structure: Order Routing Practices, Considerations, and Opportunities," *Charles Schwab*, Q2 2022 ("Schwab White Paper"), Exhibit 3.
[17] "The Impact of Zero Commissions on Retail Trading and Execution," *Greenwich Associates*, February 25, 2020, available at https://www.greenwich.com/equities/impact-zero-commissions-retail-trading-and-execution.
[18] Robert P. Bartlett, III (2022), "Modernizing Odd Lot Trading," *Columbia Business Law Review*, Vol. 2021, No. 2, pp. 539, 545. See Figure 4.
[19] Schwab White Paper, Footnote 21.

notional volume) received size improvement in 2020.[20] Charles Schwab estimated that its customers received approximately $4.4 billion in size improvement in 2021.[21]

13. Moreover, execution speed has become significantly faster over the last few decades, with current execution times for most trades averaging just fractions of a second. Angel et al. (2015) show that the average execution time for trades of NYSE-listed stocks ranging in size from 100 to 9,999 shares decreased from approximately 25 seconds in 2001 to approximately two seconds in 2012.[22] This trend has continued. Several retail brokers report that their average execution time for orders of fewer than 1,999 shares in Q1 2022 was 0.05 seconds or less.[23]

B. The Role of Wholesalers and the Benefits They Provide to Retail Investors under the Current Market Structure

14. In today's markets, wholesalers play a crucial role in improving trading results for retail investors. Understanding this role provides helpful context to better understand and evaluate how potential regulations could upend and disrupt the balancing factors that have contributed to the structure of today's equity markets, and which currently benefits retail investors.

15. Trading in U.S. equity markets is highly competitive. There are 16 nationally registered stock exchanges, more than 30 alternative trading systems ("ATSs"),[24] and many dealers and off-exchange market makers who facilitate or provide liquidity for off-exchange executions. In 2020, trading on the national securities exchanges accounted for 62% of the dollar trading volume, while trading on ATSs accounted for about 11%, and trading on non-ATS venues accounted for 27%.[25]

16. The number and diversity of trading venues and liquidity providers indicate significant competition in U.S. equity markets. Numerous aspects of the current regulatory regime

[20] "Measuring Real Execution Quality," Presentation to the Investor Advisory Committee at the U.S. Securities and Exchange Commission, updated August 27, 2021, Virtu Financial. Available at: https://virtu-www.s3.amazonaws.com/uploads/documents/virtu-real-pi_20210827.pdf.
[21] Charles Schwab notes that "Size improvement, according to Virtu, was approximately 2x the amount of net price improvement on Rule 605 covered orders. Schwab's net price improvement was $2.2B in 2021." Schwab White Paper, p. 13.
[22] James J. Angel, Lawrence E. Harris, and Chester S. Spatt (2015), "Equity Trading in the 21st Century: An Update," *Quarterly Journal of Finance*, Vol. 5, No. 1, p. 12.
[23] See e.g., "Commitment to execution quality," *Fidelity*, available at https://www.fidelity.com/trading/execution-quality/overview; "Order Execution Quality," *TD Ameritrade*, available at https://www.tdameritrade.com/tools-and-platforms/order-execution.html.
[24] "SIFMA Insights: US Equity Market Structure Analysis," *SIFMA*, September 2021, available at https://www.sifma.org/wp-content/uploads/2021/09/SIFMA-Insights-Market-Structure-Matters-09-2021.pdf, p. 4.
[25] "2022 FINRA Industry Snapshot," *FINRA*, available at https://www.finra.org/sites/default/files/2022-03/2022-industry-snapshot.pdf, p. 37.

encourage and intensify competition among these venues. Moreover, as market structure has evolved, trading firms, to remain competitive, have sought to improve execution quality and lower trading costs for institutional and retail investors. One type of market innovation that has resulted in better execution quality is pooling investors into separate risk pools. For example, ATSs are venues where passive institutional investors, whose primary economic motive is to minimize the price impact of their order executions, trade anonymously. By executing trades in "dark pools," these investors avoid exposing their large trades while seeking potential buyers and sellers. Another example is how wholesalers serve as strategic outsourcing venues for retail brokers. Because retail trade flow is associated with lower adverse selection risk (meaning a lower chance that the market will move against the liquidity provider after a trade), wholesalers can provide better execution quality by segmenting order flow into separate markets based on their relative degree of informativeness, while on-exchange market makers handle trade flow associated with higher adverse selection and are unable to segment order flow.

17. Brokers still face challenges when trying to satisfy their best execution obligations. For example, there are many venues where liquidity providers do not display their quotes, such as ATSs and hidden orders on exchanges, making it harder for brokers to find the best price available for their customers.

18. Wholesalers perform two separate but interrelated functions concerning the execution of retail orders. First, wholesalers act as market makers who provide liquidity to retail orders by standing ready to buy or sell securities regularly and continuously on their own account. This requires a capital commitment so that they can provide liquidity in quantities sufficient to take the other side of the trade. In doing so, wholesalers take shares into their inventory, creating long or short positions that exposes them to market risk.

19. Second, they work with retail brokers to facilitate the "handling and execution" of the retail brokers' orders. Because they handle order flow and are not merely providing liquidity as a market maker, the wholesaler takes on the duty of best execution for these orders. Thus, a wholesaler cannot simply internalize all order flow but rather it must diligently find the best available price.[26] In practice, this means that wholesalers have direct connections to the

[26] Under FINRA rules, this means that the wholesaler "shall use reasonable diligence to ascertain the best market for the subject security and buy or sell in such market so that the resultant price to the customer is as favorable as possible under prevailing market conditions." See "Regulatory Notice 21-23, Best Execution and Payment for Order Flow," FINRA, available at https://www.finra.org/sites/default/files/2021-06/Regulatory-Notice-21-23.pdf.

exchanges, ATSs, and other dealers and can access liquidity in those other venues on behalf of the retail orders when necessary to ensure the customer order gets the best price available. Wholesalers typically accept order flow on a wide range of securities, including many that are highly illiquid. An analysis of proprietary data from Virtu shows that in December 2020, it accepted orders on nearly 8,000 distinct equity securities.[27]

20. Numerous studies use public and private data to document how trades routed to wholesalers receive superior execution relative to those routed to public exchanges. For example, Kothari, Johnson, and So (2021) show that the average price improvement for trades from Robinhood, which routes almost all of its trades to wholesalers, is 52% better than the price improvement for exchange trades of the same stocks on the same day.[28] Battalio and Jennings (2022) use proprietary data and exchange feeds to compare "seemingly identical" marketable orders routed to wholesalers and exchanges.[29] When factoring in exchange fees, they find wholesalers receive better prices over 90% of the time. Additionally, they find that wholesalers provide substantial supplemental price improvement to orders routed to external venues. In other words, using their own capital, wholesalers improve the execution prices given to customers. The net effect is that customers who would otherwise receive negative price improvement on these orders executed on an exchange receive positive price improvement from wholesalers.[30] Dyhrberg, Shkilko, and Werner (2023) use over three years of publicly available monthly data to compare trade quality between a set of aggregated wholesalers and a set of aggregated exchanges.[31] They report a higher portion of price-improved shares from wholesalers (66% vs. 10%) and a lower E/Q ratio for wholesalers (0.76 vs. 0.97) and conclude that "retail investors would generally be worse off on exchanges." The Commission's analysis of Rule 605 data (presented in "Table 6" in the Order Competition Rule Proposal) indicates an even sharper contrast between wholesaler and exchange execution quality. It reports higher fill rates of 69.1% vs. 27.3%, better E/Q ratios of 0.42 vs, 1.00, and a larger proportion of price-improved shares of

[27] See the Appendix for more details.
[28] S.P. Kothari, Travis L. Johnson, and Eric C. So, "Commission Savings and Execution Quality for Retail Trades," working paper, p. 2, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3976300.
[29] Robert H. Battalio and Robert H. Jennings, "Why do Brokers who do not Charge Payment for Order Flow Route Marketable Orders to Wholesalers?," working paper, cover page, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4304124.
[30] The analysis of Virtu data in the Appendix is consistent with this finding, showing that in December of 2020, Virtu provided $7.8 million in supplemental price improvement, of which $6.8 million was provided for orders routed fully or partially to exchanges.
[31] Anne Haubo Dyhrberg, Andriy Shkilko, and Ingrid M. Werner, "The Retail Execution Quality Landscape," working paper ("Dyhrberg et al."), p. 11, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4313095.

84.7% vs. 8.8% for wholesalers vs. exchanges.[32] For convenience, I show the Commission's analysis in Table 1.

Table 1: Excerpt from "Table 6: Rule 605 Wholesaler (WH) and Exchange (EX) Execution Quality Comparison for Marketable Orders under $200,000 for Q1 2022 by Security Type"

	All NMS Stocks	S&P 500	Non-S&P 500	ETF
Average Price	$33.99	$97.03	$13.52	$51.19
WH Share Volume (billion shares)	96.51	15.00	62.32	19.18
WH Dollar Volume (billion $)	$3,280.03	$1,455.40	$842.66	$981.98
EX Share Volume (billion shares)	172.08	39.89	86.67	45.52
EX Dollar Volume (billion $)	$9,025.52	$3,448.64	$1,899.61	$3,677.27
WH Fill Rate (%)	69.06%	73.17%	66.65%	65.03%
EX Fill Rate (%)	27.31%	32.53%	29.56%	17.63%
WH Effective Spread (bps)	2.05	0.72	5.70	0.89
EX Effective Spread (bps)	3.11	1.45	7.86	1.49
WH Realized Spread (bps)	0.72	0.30	1.55	0.64
EX Realized Spread (bps)	-0.67	-0.30	-1.97	-0.12
WH Realized Spread Adj PFOF (bps)	0.43	0.17	0.86	0.45
EX Realized Spread Adj Rebate (bps)	-0.001	-0.05	-0.24	0.28
WH Price Impact (bps)	1.33	0.42	4.15	0.25
EX Price Impact (bps)	3.78	1.74	9.83	1.61
WH E/Q Ratio	0.42	0.35	0.49	0.45
EX E/Q Ratio	1.00	0.98	1.00	1.01
WH % Pct of Shares Price Improved	84.7%	86.7%	82.5%	83.4%
EX % Pct of Shares Price Improved	8.8%	10.9%	9.5%	5.2%

21. There are several well-documented economic mechanisms that contribute to superior wholesaler execution, above and beyond the wholesaler's best execution obligations. One key mechanism is market segmentation. Compared to retail order flow, institutional order flow tends to involve sustained trading in a particular direction, making it more predictive of future price movements, primarily because, on average, institutional order flow is more informed. When a market maker quotes a price on an exchange, the quote needs to be wide enough to compensate the market maker for taking on greater adverse selection risk, which is the risk that the market will move against the liquidity provider due to trading against an investor who may have superior information about the stock. In contrast, when a wholesaler accepts orders from retail brokers, the wholesaler anticipates lower adverse selection risk and is therefore willing to offer liquidity at a better price (*i.e.*, pay a higher price to buy from a retail sell order or accept a lower price to sell to a retail buy order).

[32] See Order Competition Rule Release, Table 6.

22. Another mechanism promoting superior execution quality for retail orders is the intense competition between wholesalers, which retail brokers enforce. Brokers, who have a duty of best execution, use multiple wholesalers and rigorously evaluate the execution quality of each wholesaler, adjusting their order routing based on execution quality. For example, Schwab has described how it has "invested in its own order routing capabilities to ensure that seamless routing changes from one wholesaler to another can be made based on execution performance."[33] Anchoring the allocation of order flow on execution quality aligns the incentives of wholesalers and brokerage customers, who directly benefit, for example, by receiving better price improvement on their trades. Academic studies have validated this competitive dynamic. For example, Dyhrberg et al. find that wholesalers with lower realized spreads in a given month tend to attract more order flow in the following month.[34] Wholesalers also invest heavily in routing technology to source the best liquidity.[35]

23. In summary, wholesalers provide measurable value to retail investors relative to exchanges across several economic factors, such as market segmentation and robust competition. Currently, wholesalers are incentivized to find liquidity at the best prices available in the market, including hidden liquidity inside the NBBO, and to match or improve on the best price they find. Wholesalers' use of technology enables retail investors to obtain the price and size improvement levels they are currently getting. Any proposal that seeks to make drastic changes to the status quo should carefully consider the risk of undermining these aspects of the current market structure and the risk that execution quality may worsen. As discussed in Section III.D below, the Order Competition Rule Proposal, in particular, presents a serious risk of undermining execution quality and certainty for retail investors.

III. Economic Analysis of the Equity Market Structure Proposals

24. The Commission's economic analysis is severely flawed and falls short of the standard it sets in its guidelines for economic analysis. Adopting these rules as proposed would impose a significant risk to well-functioning markets that have benefited retail investors.

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[33] Schwab white paper, p. 14.
[34] Dyhrberg et al., pp. 5–6. The authors observe this effect for market orders in S&P 500 stocks.
[35] Schwab notes the comparative advantage of wholesalers, who focus on and invest in "sophisticated order routing / liquidity seeking capabilities, cutting-edge and resilient technology platforms, and highly specific risk management capabilities." See Schwab White Paper, p. 8.

25. This section is organized as follows: Section III.A describes the SEC's guidance for conducting an economic analysis as part of a proposed rule; Section III.B explains how the Commission has failed to provide an economic justification for its Proposed Rules; Section III.C explains why the Commission's economic analysis is inadequate and at odds with good policymaking; Section III.D describes how unintended consequences, particularly for the Order Competition Rule Proposal, may worsen market quality; and Section III.E describes specific flaws with the economic analysis in the Tick Size and Best Ex Rule Proposals. Finally, Section III.F recommends an alternative approach the Commission could take to improve equity market quality that is measured, analytical, and carries much less risk of dismantling the existing dynamics in the market that have resulted in extraordinary benefits to investors.

A. The SEC's Guidelines for Economic Analysis

26. The Commission's guidance on conducting an economic analysis includes four substantive components to be addressed:

i. the clear identification of a need for the rulemaking—a so-called "market failure" being one possibility—and an explanation of how the proposed rule will meet that need;
ii. the characterization of an appropriate economic baseline against which to measure the proposed rule's likely economic impact ("in terms of potential benefits and costs, including effects on efficiency, competition and capital formation in the market(s) the rule would affect");
iii. the identification and evaluation of reasonable alternatives to the proposed regulatory approach; and
iv. an assessment of the potential economic impact of the proposed rule and reasonable alternatives "by seeking and considering the best available evidence of the likely quantitative and qualitative costs and benefits of each."[36]

27. Based on a review of the economic analyses of the Proposed Rules, the Commission fails to meet the standards described above, and the resulting economic analyses contained in the four separate rule proposals are inadequate. The Commission fails to establish a clear justification for its Proposed Rules and does not address the problems it purports exist. These inadequacies are

[36] Guidance, pp. 1–2.

explained in more detail below. Additionally, the Commission has not sufficiently established a baseline against which to measure the impact of its Proposed Rules.

28. In sum, the Commission has failed to conduct a robust, high-quality, or informative economic analysis consistent with its own guidance. As a result, if the rules are adopted as proposed, there is a significant risk that the markets would become less efficient and retail investors would be harmed.

B. The Commission Has Not Provided an Adequate Justification for the Order Competition and Best Ex Rule Proposals and U.S. Equity Markets May Become *Less* Competitive under the Proposals

29. The Commission does not articulate market failures in the U.S. equity markets that would justify a need for new regulation. Instead, it relies on internal analyses, some of which are based on non-public data, and claims there is a lack of competition which results in suboptimal execution quality for retail orders.

30. These concerns animate the Commission's justification for the Order Competition and Best Ex Rule Proposals. Specifically, both proposals include the same two core analyses. The first analysis assesses available midpoint liquidity by examining how often the Consolidated Audit Trail ("CAT") data show hidden liquidity at the midpoint on at least one venue at the same time wholesalers internalize retail orders at prices worse than the midpoint.[37] From this, the Commission infers that brokers fail to find hidden liquidity when available. The second is the "Competitive Shortfall Analysis," which suggests that economic profits are higher for marketable retail orders executed off-exchange by wholesalers than for (presumably non-retail) orders executed on exchanges. From this, the Commission infers that price improvement for retail orders would be much more significant if those orders were sent to an auction where

[37] It should be noted that it is nearly impossible for anyone other than the Commission to perform this analysis, because it used CAT data and involved non-public, non-displayed orders. While the release contains a general description of what the analysis purports to do, it is difficult to understand what assumptions or decisions the staff had to make when implementing the analysis, or to verify that it was done correctly. I understand that SIFMA submitted a FOIA request for the CAT data, which was used by the Commission in its analysis, to be made publicly available. See "Request to Extend Comment Period on Four Rule Proposals," *SIFMA*, February 8, 2023, available at https://www.sifma.org/wp-content/uploads/2023/02/Request-to-Extend-Comment-Period-on-Four-Rule-Proposals.pdf. The release of this data would provide commenters with an opportunity to assess the accuracy and reliability of the Commission's analysis.

liquidity providers could bid competitively. Notably, there is considerable uncertainty with the Commission's analysis, which it acknowledges.[38]

31. As discussed below, these two analyses have fundamental flaws and, as such, do not support the Commission's justifications for the Order Competition or Best Ex Rule Proposals. Moreover, there are numerous reasons why the qualified auctions the Commission proposes are not likely to result in more competitive markets.

1. The Commission's Claim of Frequent Non-Displayed Midpoint Liquidity Is Severely Flawed

32. In both the Order Competition and Best Ex Rule Proposals, the Commission attempts to justify the rule with an analysis that suggests there was frequent non-displayed midpoint liquidity available at times when retail orders were executed at inferior prices,[39] implying that brokers may be failing to achieve best execution because they are not trading against available midpoint liquidity.[40] The Commission also cites this analysis as support for its assumption that there is significant unmet liquidity that would be willing to participate in the qualified auctions under the Order Competition Rule Proposal.

33. The Proposed Rules' description of midpoint liquidity is insufficiently granular to determine how the amount of midpoint liquidity is estimated. High-level descriptions are potentially problematic because it appears that the Commission's analysis did not consider order details that constrain how the midpoint liquidity order may be executed. Since the Commission's analysis matches retail orders to resting midpoint liquidity, a failure to control for order details,[41] such as a size constraint, will include orders that could not have been executed in the manner assumed by the Commission, resulting in an overstatement of the potential benefits. For example, many venues, especially ATSs, allow investors to set a minimum quantity for a

[38] For example, the Order Competition Rule Release states: "The Commission acknowledges considerable uncertainty in the costs and benefits of this rule because the Commission cannot predict how different market participants would adjust their practices in response to this rule." See Order Competition Rule Release, p. 254.

[39] See Order Competition Rule Release, Table 19; Best Ex Rule Release, Table 8.

[40] See Order Competition Rule Release, p. 182(The SEC states that "on average, 75% of [shares internalized by wholesaler at prices less favorable than the NBBO midpoint] could have hypothetically executed at a better price against the non-displayed liquidity resting at the NBBO midpoint on exchanges and NMS Stock ATSs.").

[41] Given the lack of a detailed description of how midpoint liquidity is identified, it is assumed that the Commission ignored minimum size constraints in its analysis of the availability of midpoint liquidity. This underscores the importance of providing a clear roadmap so that readers can understand how the analysis was conducted, especially in situations where the data used is non-public and replication is not possible.

trade,[42] and analysis shows that they use this feature frequently. For example, a major ATS firm, Intelligent Cross,[43] reports that "close to 60% of mid-point and near side pegged ordered shares had [a minimum quantity] specified."[44] If an institutional investor places hidden orders with a minimum quantity restriction deliberately, these orders would not trade against other smaller-sized (such as retail) orders even if they are at the same venue. Since institutional investors often trade in large blocks, while retail investors typically trade in smaller sizes, much of the hidden liquidity the Commission has identified is likely unavailable to most retail investors, which overstates the amount of accessible midpoint liquidity, mitigating a significant fraction of the Commission's estimated benefits associated with an auction mechanism.

34. One important economic reason an institutional investor would set a high minimum quantity for its hidden resting midpoint orders is to minimize information leakage. If an investor did not set a sufficiently large minimum quantity, a relatively small order could reveal its trading interest. Setting a large minimum quantity prevents the hidden resting midpoint order from being quickly revealed to the market and helps the institutional investor minimize price impact. Reducing price impact is a key objective of institutional investors that trade large quantities that take longer to complete.

35. If midpoint liquidity is deliberately provided in a way that prevents interaction with small orders, such as those of the average retail investor, the Commission's analysis of available midpoint liquidity cannot serve as (i) evidence of a failure of best execution under the current market structure or (ii) evidence that a qualified auction with retail-sized trades would incentivize liquidity providers that currently seek midpoint executions to participate in the auctions.

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[42] See e.g., Robert P. Bartlett, III and Justin McCrary (2015), "Dark Trading at the Midpoint: Pricing Rules, Order Flow and Price Discovery," working paper, footnote 9, available at https://www.stern.nyu.edu/sites/default/files/assets/documents/2%20Bartlett%20and%20McCrary%20Shall%20We%20Haggle.pdf ("For instance, Credit Suisse's Crossfinder, the largest ATS by trading volume, notes in its Form ATS that '[p]articipants have the option on Orders to specify…a minimum quantity.'"); "UBS ATS: UBS Binary Protocol (UBP) Specification," *UBS*, October 2019, p. 1, available at https://www.ubs.com/global/en/investment-bank/electronic-trading/equities/unique-liquidity/_jcr_content/mainpar/toplevelgrid_491929606/col1/innergrid_1876722392/xcol2/linklist/link_2093927680.1415558836.file/PS9jb250ZW50L2RhbS9hc3NldHMvaWIvZ2xvYmFsL2VsZWN0cm9uaWMtdHJhZGluZy9kb2MvdWJzLWF0cy1iaW5hcnktcHJvdG9jb2wtdWJwLXNwZWNpZmljYXRpb24tb2N0LTIwMTkucGRm/ubs-ats-binary-protocol-ubp-specification-oct-2019.pdf ("Minimum Quantity: Minimum quantity for each execution on the order.").

[43] According to FINRA, Intelligent Cross LLC had the third highest share volume among all ATSs, during the week of January 9, 2023. See "FINRA Transparency Data," *FINRA*, available at https://otctransparency.finra.org/otctransparency/AtsData, accessed February 3, 2023.

[44] "Minimum Quantity: Order Protection vs. Venue Optimization," *BAIRD*, April 28, 2021, available at https://www.rwbaird.com/newsroom/news/2021/04/order-protection-vs-venue-optimization/.

36. Other factors regarding trading access undermine the Commission's assumption of frequent midpoint liquidity. ATSs can be selective with whom they allow access to their liquidity. For example, an ATS run by a broker can decline to accept order flow from a competing broker. Other ATSs may restrict participation by certain types of traders. Therefore, even if the Commission sees non-displayed midpoint liquidity on the CAT tape at a particular venue, this liquidity is not necessarily available to all market participants.

37. Even if some midpoint liquidity identified by this analysis is accessible to retail order flow, it does not necessarily imply that retail investors could access that liquidity more often under the Proposed Rules. It does not necessarily follow that an investor making liquidity available at the midpoint on an ATS would be interested in participating in retail auctions under the Order Competition Rule Proposal, nor has the Commission demonstrated that such investors would likely participate in the auctions. The existence of untapped liquidity at the midpoint does not constitute evidence of a failure of a broker's best execution obligation. The Commission recognizes that brokers need to consider the trade-off between price improvement and execution delay in deciding how many markets to ping when executing an order.[45] However, the Commission's analysis of CAT data aggregates available midpoint liquidity across all liquidity providers, even relatively small venues. Thus, this highly theoretical analysis would "find" midpoint liquidity even if a broker would need to ping 30 or 40 different venues.

38. A broker handling a market order for an investor in a fast-moving market cares about execution speed and may determine it is optimal to check for liquidity in a few of the best venues before executing, even under the Best Ex Rule Proposal. The time delay associated with an exhaustive search for the availability of midpoint liquidity creates a significant risk that prices will move against retail investors, especially in fast-moving markets that are characterized by significant adverse selection risk. Yet, the Commission has not presented any analysis showing that an execution delay would not harm investors. Given the speed at which prices change in today's markets, which will only continue to increase, the Commission cannot simply ignore how an execution delay will impact retail investors.

[45] Best Ex Rule Release, p. 95 ("Proposed Rule 1101(a)(2)(iii) would require a broker-dealer's policies and procedures to address how it will reasonably balance the likelihood of obtaining better prices with the risk that delay could result in worse prices in determining the number and sequencing of markets to be assessed for its customers' orders.").

39. The Commission's failure to define best execution is a crucial omission of the Proposed Rules. A careful reading of the four separate rules leaves the reader with the impression that their overarching goal is to provide retail investors with greater access to midpoint pricing. In this context, midpoint pricing becomes the *de facto* standard for measuring best execution. In effect, the Commission is equating best execution with greater access to midpoint pricing and ignores other indicators of execution quality, like execution speed. A broker handling an institutional order may prioritize executing trades in larger blocks over executing smaller quantities at slightly better prices. Therefore, identifying "ignored" liquidity is not evidence of a failure of best execution. Nowhere in the Proposed Rules does the Commission discuss how brokers should assess the various tradeoffs involved in providing best execution. Since a broker cannot lock in quotes as it searches for midpoint liquidity, a requirement to ping an excessive number of trading venues to search for midpoint liquidity risks delays in execution speed and certainty due to quote fade in the intervening period. The Commission has ignored the tradeoff between midpoint liquidity and execution speed and that brokers balance these competing objectives.

2. The Commission's Interpretation of Realized Spreads, a Key Assumption in Its Competitive Shortfall Analysis, Is Severely Flawed

40. The Order Competition and Best Ex Rule Proposals contain numerous tables summarizing realized spreads observed from various subsamples of stocks from orders executed on exchanges and from orders of retail investors executed by wholesalers.[46] These tables purport to show that marketable orders executed on exchanges have lower realized spreads than those executed by wholesalers (indeed, it shows that orders executed on exchanges even have negative realized spreads). To interpret this information, the Commission assumes that (i) realized spreads approximate a liquidity provider's economic profit and (ii) on-exchange liquidity providers would be willing to provide additional liquidity at the same marginal profit to retail flow if only they had access to such flow.[47] Accordingly, if the order flow that wholesalers currently receive is instead routed to qualified auctions (*i.e.* order-by-order competition), the

[46] See Order Competition Rule Release, Tables 5–9.

[47] See Order Competition Rule Release, p. 212 ("Realized spreads are a proxy for the potential economic profit that liquidity suppliers may earn on a trade."); Best Ex Rule Release, pp. 270−271 ("[T]he realized spread serves as a proxy for wholesaler's economic profits before any fees are taken out.").

Commission assumes that these orders would receive more price improvement from liquidity providers, such that the realized spreads on these orders would be equivalent to the realized spreads observed on exchanges. The Commission calls the difference "forgone price improvement" and claims the benefit ranges from $1.12 to $2.35 billion annually.[48]

41. The conclusion that exchange order flow is subject to more adverse selection risk than retail order flow (*i.e.*, exchanges receive more "informed" orders) is not surprising or controversial. Importantly, this confirms one of the fundamental economic reasons why retail orders can benefit from being segregated and executed off-exchange.

42. Realized spreads measure transaction costs and market quality. Mechanically, the realized spread is similar to the effective spread (the difference between the execution price and the quote midpoint). However, it also factors in the short-term price impact of the trade, measured as the change in the quote midpoint after a short time interval, such as one minute.[49] Realized spreads are not a proxy for profitability because they ignore inputs that impact profitability, such as inventory holding costs, fixed costs, and transaction rebates and fees. Academics have noted that the "realized spread earned by wholesalers may represent either a substantial profit, or a combination of inventory and fixed costs that allows only for a zero profit, or anything in-between."[50]

43. From the perspective of a liquidity provider who seeks to earn the spread (*i.e.*, a market maker), the realized spread reflects the degree to which the incoming order flow predicts future price movements, making it a proxy for the adverse selection faced by the liquidity provider. The period used to calculate realized spreads approximates the market maker's assumed holding period, *i.e.*, the time it takes to flatten the position. If realized spreads are decreasing over time,

[48] Order Competition Rule Release, pp. 261−262.

[49] Strictly speaking, the difference between a trade's execution price and the future NBBO midpoint represents the realized half-spread. It is referred to as "realized spread" to be consistent with the proposing releases. See Order Competition Rule Release, p. 188. Liquidity providers have different holding periods, but this nuance is lost when relying on realized spreads. The SEC even acknowledges the trade-offs that must be made in setting the subjective parameters of the metric, and notes that "it is unclear whether the choice of any specific measurement horizon results in realized spreads more accurately measuring adverse selection risk, as the 'ideal' measurement horizon is not easily observable." See 605 Rule Release, pp. 249−251 ("Selecting an appropriate time horizon to calculate the realized spread must strike a balance between too short, which could distort the measures by transitory price impact, and too long, which could measure noise or the cumulative impact of subsequent market changes which are unrelated to the order's execution quality. An ideal measurement horizon would be one that aligns with the amount of time an average liquidity provider holds onto the inventory positions established from providing liquidity, which is not easily observable.").

[50] See e.g., Dyhrberg et al., p. 13.

this is a signal that the market maker is facing more adverse selection, and it should adjust its quotes to reflect the more "informed" nature of order flow.

44. Assuming the liquidity providers are market makers, an average negative realized spread would suggest that the market makers have not appropriately adjusted their quotes and have experienced (paper) losses in the one-minute (or five-minute) period immediately following their trades. This is an unrealistic and uneconomic assumption for a market maker, either on- or off-exchange, because a market maker seeks to earn the spread. Accordingly, there is no reason to believe that the price improvement expected by the Commission in the qualified auctions would be provided by market makers.

45. The negative realized spreads that the Commission observes on exchanges indicate that one- and five-minute windows are too long to accurately measure market maker profitability. By contrast, realized spreads are an effective way to measure the short-term price impact experienced by non-market maker liquidity providers who have longer-term trading horizons. Given their different investment objectives, there is no basis for assuming that non-market maker liquidity providers are motivated by realized spreads or that realized spreads play a role in the decisions these liquidity providers make regarding how and where they will provide liquidity.

46. Take, for example, an institutional investor who has decided to execute a trade based on a proprietary trading strategy. The investor may need to work the (potentially large) trade over hours or even days and may attempt to conceal its trading interest by trading on anonymous platforms like ATSs. This investor may also break its trade into smaller pieces that get routed to various trading venues, including exchanges. As discussed in Section III.B.1, such an investor may even forgo some opportunities to trade at "good" prices to minimize information leakage. This investor would not rely on realized spreads to measure its execution quality, partly because it will hold the position long-term, implying that a 60-second (or 5-minute) measure of market impact has no practical meaning. Instead, it will measure execution quality using metrics like implementation shortfall and a volume weighted average price ("VWAP") benchmark. Notably, this type of investor has a very different motivation in providing liquidity to the markets than a market maker. However, the Commission's economic analysis estimates the benefit of its rule based on the realized spreads of such investors.

47. Given the diversity of liquidity providers with different objectives for participating in the market, the SEC has no basis for comparing exchange-realized spreads and wholesaler-realized spreads. Dyhrberg et al. articulate this point and caution against making such a comparison:

> "[N]on-market makers['s] main goal is to manage positions rather than earn spread revenue. The realized spreads that non-market makers earn are therefore not reflective of market making costs and profits. Since non-market makers' share of exchange liquidity provision is significant, caution should be used when comparing exchange realized spreads to wholesaler realized spreads."[51]

Accordingly, the Commission's claimed benefit of forgone price improvement, which is based on a comparison of realized spreads between wholesalers and exchanges, is unreliable.

48. In addition to these limitations associated with using realized spreads as a measure of foregone price improvement, the Commission's Competitive Shortfall Analysis implicitly makes an apples-to-oranges comparison because it does not differentiate between the significantly different ratios of "market" to "marketable limit" orders executed on- and off-exchange, and the realized spreads associated with these different order types. Marketable limit orders, which are widely used on exchanges, show a higher degree of investor sophistication relative to market orders (which are nearly non-existent on exchanges), because they indicate that the investor is not willing to be filled beyond a certain price point. The Commission's analysis of 605 data finds that 79.2% of wholesaler order flow consists of market orders compared to only 0.3% on exchanges. But even more notable is that the average realized spreads for market orders are five times higher on exchanges than those of wholesalers (2.40 vs. 0.39),[52] suggesting that exchanges are much more "profitable" than wholesalers with market orders (applying the Commission's logic). Yet, the Commission bases its forgone price improvement estimate on a weighted average of realized spreads for all marketable orders (both market and marketable limit orders) despite the different nature of the order flow on- and off-exchange. The notion that price improvement for retail orders, which is predominantly made up of market orders, could be significantly improved solely based on observed differences in realized spreads for all marketable orders is fundamentally flawed and unsupported. In fact, the significantly higher

[51] Dyhrberg et al., p. 13.
[52] Order Competition Rule Release, Table 5.

realized spreads on exchanges for market orders calls into question the Commission's entire conclusion about foregone price improvement.[53]

49. The Commission also has no valid basis for assuming differences in realized spreads alone would incentivize liquidity providers to participate in qualified auctions, even if the auctions allowed them access to retail trade flow because realized spreads do not inform how and why non-market makers provide liquidity. In summary, realized spread is not a metric that predicts or informs non-market maker liquidity provision, and cannot be used to gauge how much liquidity would move to qualified auctions nor how much incremental price improvement liquidity providers might provide.

3. The Commission Has No Basis to Assume Adverse Selection Risk Will Induce Investors to Provide Liquidity to Qualified Auctions

50. In its competitive shortfall and midpoint liquidity analyses, the Commission assumes that liquidity providers would be willing to provide liquidity to the qualified auctions. The Commission claims "(t)he lower adverse selection risk of individual investor orders should incentivize other liquidity providers to participate in qualified auctions."[54]

51. As discussed in the prior section, non-market maker liquidity providers, primarily institutional investors, care more about position management than earning the spread.[55] For these liquidity providers, trading is motivated by an underlying investment thesis (*e.g.*, fundamental research), and they are in the market to minimize the price impact of executing these orders. Since auction messages and confirmations are publicly available to all market participants, their participation in the auctions likely increases the risk of revealing their trading interests. Such information leakage could more significantly impact their costs than the purported benefit of interacting with small-sized retail orders. As such, it is unclear how much institutional investors would be incentivized to participate in the auctions.

52. If institutional investors found it desirable to interact with retail order flow (*i.e.*, order flow associated with lower adverse selection), one would expect to see their active participation

[53] The Commission performs a similar analysis that uses CAT data. Because this analysis also is based on all marketable orders, it is subject to the same critique.
[54] Order Competition Rule Release, p. 315.
[55] See Dyhrberg et al., p. 4 ("Covering market making costs and earning liquidity provision profits is not as important to non-market making algorithms as to their market making counterparts, if at all.").

in the existing retail liquidity programs that many of the exchanges already offer and that have been viewed as a "close empirical analogue" to order-by-order auctions.[56] However, as the Commission notes in the Order Competition Rule Proposal, the volume executed through these retail liquidity programs is minimal,[57] undermining the Commission's assumption that institutional investors would interact with retail flow in the qualified auctions if given the opportunity.

53. Additionally, because institutional investors' trading is motivated by an underlying investment thesis such as fundamental research, they will likely have a pre-determined amount to trade. If, as the Commission predicts, these investors will participate in the qualified auctions,[58] they will divert liquidity from other venues where they are currently trading, such as ATSs or the exchanges' continuous order books, resulting in less liquidity at these other venues, potentially increasing trading costs to investors who continue to trade at those venues.

4. There Are Economic Reasons Suggesting Qualified Auctions Could Worsen Trade Execution Quality for Both Retail and Institutional Investors

54. There are economic reasons to believe that the qualified auctions under the Order Competition Rule Proposal would not achieve the type of benefits the Commission expects and may even worsen trade execution quality under the proposed rule.

55. The mandated structure of qualified auctions would create an informational disadvantage to retail investors. Specifically, qualified auctions require retail order flow to be announced publicly, and these auctions cannot be shorter than 100 milliseconds. By observing these announcements, liquidity providers could indeed have time to (given the forced delay) fade their quotes, particularly when they detect large imbalances in retail orders. Similarly, arbitrageurs observing these retail order auction signals would be able to trade ahead of retail order flow. For example, arbitrageurs that detect a significant buy interest from retail investors based on the

[56] See e.g., Thomas Ernst, Chester S. Spatt, and Jian Sun, "Would Order-By-Order Auctions Be Competitive?" working paper, pp. 4−5, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4300505.

[57] Order Competition Rule Release, p. 208 ("[I]t is the Commission's understanding that the share of individual investor trading volume executed through RLPs is small. For example, in 2021, less than 0.2% of consolidated volume executed in exchange RLP programs.").

[58] Order Competition Rule Release, p. 316 ("The availability of marketable individual investor order flow at qualified auctions would likely draw institutional trade execution algorithms to supply liquidity in qualified auctions, where they might trade at the quote midpoint or at least inside the NBBO.").

public auction messages may first buy all the available volume at the prevailing offer price and then profit by selling such volume to retail investors at a higher price.

56. Qualified auctions may negatively affect exchange limit order books and venues that do not host auctions. Under the current market structure, wholesalers route part of their retail order flow to exchanges and ATSs. Suppose that all retail flow under $200,000 is diverted to auctions as stated in the Order Competition Rule Proposal. In that case, fewer retail orders would interact with the limit order books of exchanges or at any venues where retail flow is currently sent. The remaining order flow on those venues would have a higher proportion of institutional orders with greater adverse selection risk. Exchange market makers now facing higher adverse selection would increase quoted spreads, leading to wider quoted spreads on exchanges. This effect will be amplified if the diverted trade flow decreases trading venue volume. Institutional investors that trade at these venues would incur higher trading costs. Retail investors also could be affected if the auction fails—in this case, retail orders might be routed to exchanges or ATSs to be executed at the quote, and, therefore, they would receive even worse execution because they would be exposed to wider quoted spreads.

57. Additionally, retail orders routed to qualified auctions are likely to be systematically harmed in episodes of correlated order flow or high volatility. For example, a study by Charles Schwab reported that in "times of extreme volatility and wider quoted spreads, our data show that off-exchange wholesalers perform even better than exchanges. … when volatility increased or trading shifted to wider-spread securities, the non-exchange market centers were able to smooth out the cost of crossing the spread by keeping effective spreads low, while the Schwab order-flow-adjusted exchange effective spread increased more than the quoted spread."[59] Since there would be fewer natural liquidity providers during periods of increased volatility, liquidity would likely be scarce, and auctions would be more likely to fail. This effect would be amplified for illiquid stocks, meaning stocks that have low average trading volume. A failed auction would further reduce liquidity because it would signal to the market that no one was willing to provide liquidity in the auction. Accordingly, wholesalers handling these orders would be less incentivized to internalize them. Instead, these orders may get routed to exchanges with greater adverse selection where the quoted spreads would be wider and may be executed without

[59] See Schwab White Paper, p. 16.

receiving any price improvement or size improvement, worsening the execution quality of retail investors.

C. The Commission Fails to Conduct a Minimally Acceptable Economic Analysis Because It Does Not Analyze How the Separate Rules Will Interact with Each Other

58. The four separate rules the Commission has proposed address the same overarching claimed concerns about competition, conflicts of interest, transparency, and the impact on overall execution quality. Given the overlap in regulatory objectives, the Commission could have proposed a single omnibus rule that included the primary features of the four separate rules and could have addressed the interactions associated with the main rule components and whether a legitimate economic basis exists for all of them.

59. An acceptable economic analysis would need to address the incremental interactions between rule components and discuss why each feature is included. A discussion of reasonable alternatives, a required component under the SEC Guidance on Economic Analysis, would consider why different combinations of rule components (*e.g.*, enhanced 605 reporting, smaller tick increments, and enhanced 605 reporting combined with smaller minimum tick increments) did not fully address the stated regulatory objectives.

60. The Commission's decision to propose four separate rules designed to achieve the same overarching objectives does not obviate the need to consider how they interact—it remains a required component of any rigorous economic analysis. For this reason alone, the economic analysis in the proposed rules should be considered arbitrary and capricious. As a result of this failure, two fundamental issues arise that relate to how the Commission should have performed its economic analysis.

61. First, the Commission does not justify why all four rules are necessary, neither individually nor in combination. This is particularly troubling given that the proposals are designed to accomplish the same overarching goals. Second, the Commission uses the status quo of the current market structure as the baseline to analyze each rule. While this is an appropriate way to define the baseline, the Commission then evaluates each rule independently and measures benefits as if each rule is the only one being proposed. In effect, each rule ignores the possibility that the other three rules may already address the Commission's concerns.

62. To further illustrate this point, consider how each rule purports to increase competition, perhaps the most critical objective of the Proposed Rules. The Commission claims the Order Competition Rule Proposal would "benefit individual investors by promoting competition and transparency to enhance the opportunity for their orders to receive more favorable prices than they receive in the current market structure."[60] It claims the 605 Rule Proposal would "increase transparency of order execution quality … and help promote competition among market centers and broker-dealers."[61] For the Tick Size Rule Proposal, the Commission claims, "harmonization of the minimum pricing increment for the quoting and trading across venues would promote competition and innovation, while preserving most meaningful price improvement opportunities."[62] For the Best Ex Rule Proposal, it claims the "regular review process would promote competition among executing brokers and help ensure that customer orders are executed consistently with the proposed best execution standard."[63] Clearly, the expected benefit the Commission believes its rules will achieve is overlapping.

63. Alternatively, the discussion about competition could be regulatory boilerplate that the Commission includes to satisfy its mandate to consider the effects on efficiency, competition, and capital formation ("ECCF"). The possibility that it represents regulatory boilerplate is a distinct possibility because the Commission fails to establish a compelling case for why there is a market failure that requires additional regulation.[64]

64. Important policymaking questions arise from these overlapping objectives, particularly given that the Commission has yet to justify why each rule needs to be adopted. For example, are the estimated benefits purely additive? Must all the rules be adopted to achieve the desired level of competition, or might it be achieved with fewer? Might the Commission have more transparency into the effects of each new rule if they were adopted in a phased manner? If the

[60] "Fact Sheet: Proposed Rule to Enhance Order Competition," Securities and Exchange Commission, December 14, 2022, p. 2, available at https://www.sec.gov/files/34-96495-fact-sheet.pdf.
[61] "Fact Sheet: Disclosure of Order Execution Information," Securities and Exchange Commission, December 14, 2022, pp. 1–2, available at https://www.sec.gov/files/34-96493-fact-sheet.pdf.
[62] Tick Size Rule Release, p. 73.
[63] Best Ex Rule Release, pp. 154–155.
[64] According to the Current Guidance on Economic Analysis in SEC Rulemakings, "Statutory provisions added by the National Securities Market Improvement Act of 1996 and the Gramm-Leach-Bliley Act of 1999 to the 1933, 1934, and 1940. Acts—which require the Commission to consider efficiency, competition, and capital formation whenever it is 'engaged in rulemaking and is required to consider or determine whether an action is necessary or appropriate in the public interest'—expressly call for consideration of several broad economic issues in addition to the protection of investors." Guidance, pp. 2–3.

605 Rule Proposal were implemented, which arguably has the lowest chance of creating unintended negative consequences, would the Commission still believe other rules were needed?

65. As an example, if the 605 Rule Proposal were implemented and did increase the level of competition among market participants, what would be the impact to the competition shortfall which the Commission estimated, without the rule, to be $1.5 billion per year? Similarly, would $1.5 billion still be an accurate estimate under a new tick size regime where spreads would likely narrow? Presumably the competition shortfall estimate would decrease in size. At what point does the reduced benefit still justify the cost of the Order Competition Rule Proposal, which again, carries a significant risk of negative unintended consequences? The Commission presents no economic analysis to address these critical issues.

66. In summary, the Proposed Rules are highly interconnected; their intended benefits overlap significantly, but their costs tend to be orthogonal. The Commission's lack of analysis regarding the interaction of these rules overestimates their benefits because each rule refers to the same benefits. Further, without a more robust analysis of the interaction effects of these complex rules, the Commission cannot properly weigh the benefits of any given rule against its costs nor identify the least costly and least disruptive way to implement its rules.

D. The Rules Will Have Unintended Consequences That Could Undermine Many of the Benefits of the Existing Market Structure

67. The four separate rules proposed by the Commission amount to a significant overhaul of the existing equity market structure, on a scale not seen since Reg NMS. If the proposed rules are implemented, market participants will adjust how they operate, which will establish new equilibria and could shift the market in unintended ways. This section describes some of the negative outcomes that are likely to occur if the Proposed Rules were adopted.

1. Competitive Dynamics in Today's Markets That Effectively Discipline Prices Could Be Dismantled

68. The Commission has promoted two distinct yet complementary forms of competition: competition among orders and competition among market centers. The Reg NMS release describes this as follows:

> The NMS thereby incorporates two distinct types of competition – competition among individual markets and competition among individual orders – that together contribute to efficient markets. Vigorous competition among markets promotes more efficient and innovative trading services, while integrated competition among orders promotes more efficient pricing of individual stocks for all types of orders, large and small. Together, they produce markets that offer the greatest benefits for investors and listed companies.[65]

69. Historically, the Commission has tried to balance these two forms of competition in its rulemaking to create the highest quality and most efficient markets. However, in the Order Competition Rule Proposal, the Commission arbitrarily prioritizes "order-by-order competition" over competition between individual markets.[66] A significant change like this would dismantle the competitive dynamics that have evolved between market centers, dynamics that provide significant benefits to retail investors.

70. Wholesalers compete for retail market flow from retail brokers by providing timely and cost-efficient executions for retail brokerage customers. This includes offering high levels of price improvement (including a large portion of midpoint executions), offering size improvement, and guaranteeing execution for all retail trade flow, which includes the execution of many illiquid stocks. Since wholesalers have a duty of best execution (in addition to brokers), they use sophisticated order routing technology to find the best sources of liquidity. Wholesalers and retail brokers have aligned incentives to achieve superior trade executions; wholesalers use these metrics to win order flow, and retail brokers advertise them in their marketing efforts.

71. Retail brokers use multiple wholesalers and evaluate them in terms of the execution quality they provide. It is standard practice for a broker to use multiple wholesalers.[67] Routing to multiple wholesalers is instructive because it indicates that the market centers trading NMS stocks face significant competition. Retail brokers are well-positioned to hold wholesalers to account if they provide poor execution quality by increasing their allocation of order flow to those wholesalers who offer better execution quality. Notably, in the Best Ex Rule Proposal, the commission acknowledges this competitive dynamic, namely that the ability to monitor

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[65] Release No. 34-51808, June 9, 2005, p. 12.

[66] In the Order Competition Rule Proposal, the Commission acknowledges that brokers assess wholesaler allocations, but it does not address how this mechanism serves to discipline execution quality. See Order Competition Rule Release, p. 327 ("In fact, retail brokers regularly re-assess whether their current allocation of trading interest to liquidity providers, including wholesalers, exchanges, and ATSs, is optimal.").

[67] See Table A1 in the Appendix, based on Rule 606 reports.

performance and having low switching costs encourage competition and result in increased execution quality.[68] The Commission makes this observation in relation to institutional investors who use multiple broker-dealers—it is unclear why the Commission does not discuss this dynamic in its Order Competition Rule Proposal, as the same dynamic exists between retail brokers and wholesalers.[69]

72. A recent paper discusses this competitive dynamic and empirically shows that wholesalers receive higher allocations when realized spreads are comparatively lower than those of competitors.[70] The paper also shows that realized spreads did not decrease after a new wholesaler, Jane Street, entered the market or after Schwab and TD Ameritrade merged. If wholesalers had not been operating in a highly competitive market, one would expect that either of these events would have reduced the profitability of the wholesalers in the form of reduced realized spreads, yet this did not happen, indicating that wholesalers were already operating in a highly competitive environment.[71]

73. Wholesalers are incentivized to provide the best possible executions for a number of reasons. The inability to identify the best sources of liquidity will likely result in order flow being allocated to a different wholesaler who does. Also, the risk of a best execution violation motivates wholesalers to find the best executions. Wholesalers further improve execution quality by contributing their own capital to provide supplemental price improvement to orders routed externally (either fully or in part), even though this may result in a loss on those orders. The strategic allocation of order flow to market centers that provides the best executions incentivizes wholesalers to compete for order flow. It is an effective mechanism that disciplines

[68] Best Ex Rule Release, pp. 312–313, ("The Commission understands that institutional customers often utilize multiple broker-dealers in the handling of their orders, which lowers the costs of switching brokers if they exhibit poor execution quality. Furthermore, in general, the Commission believes that there is less conflict in institutional customer order handling because institutional customers have better access (compared to retail customers) to data, which they utilize to monitor and analyze the execution quality that various broker-dealers offer. The Commission believes that (compared to retail brokers) institutional monitoring and lower switching costs encourage broker-dealers to provide increased execution quality in order to compete to attract institutional orders.").

[69] As mentioned in Section II.B, the brokers evaluate wholesaler performance and adjust order flow based on execution quality. For example, as mentioned in Section II.C., Charles Schwab has "invested in its own order routing capabilities to ensure that seamless routing changes from one wholesaler to another can be made based on execution performance."

[70] Dyhrberg et al., p. 23. See also, Schwab White Paper.

[71] Note, this paper uses realized spreads as a proxy for profitability, in part because there is not a better alternative in the data. However, this use of realized spread as a proxy for profit does not have the same issues and limitations that are discussed in Section III.B.2 because the realized spreads being compared are all for wholesalers (all of which are off-exchange market makers), and the authors are not comparing realized spreads from different types of liquidity providers, such as institutional investors.

customer order execution quality.[72] This competitive dynamic between market centers ultimately benefits retail investors who receive better execution quality.

74. By mandating auctions as required under the Order Competition Rule Proposal, the Commission would displace market center competition in favor of order-by-order competition because wholesalers would no longer be able to internalize trade flow directly.

2. The Benefits Retail Investors Currently Receive from Wholesalers Could Decrease Significantly or Be Eliminated, Including Guaranteed Executions for Illiquid Stocks, High Rates of Price Improvement and Midpoint Executions, and Size Improvement

75. As noted in the previous section, wholesalers compete for order flow from retail brokers by offering high levels of price improvement (including midpoint executions), size improvement, and guaranteeing execution for all retail trade flow they receive, including for illiquid stocks. Offering these benefits as well as trade routing services represent the wholesaler's cost of doing business.

76. The Commission suggests that if there is a lack of interest from liquidity providers to participate in the auctions, most retail orders "could simply be internalized by wholesalers, similar to the current market, though perhaps at inferior prices compared to what they might have received under the current market structure."[73] Wholesalers provide price improvement on the majority of orders they receive and midpoint executions on nearly half of those orders. This behavior is the result of strong competition among wholesalers as they seek to attract order flow from retail brokers. This competition arises endogenously because retail brokers' best execution obligations require them to route order flow to the wholesaler that provides the best pricing. However, under the Order Competition Rule Proposal, most orders can only be internalized after an auction fails, meaning that wholesalers will no longer be incentivized to compete at the same levels for order flow from retail brokers, and consequently may not offer retail brokers the same level of benefits. By disrupting this competitive dynamic, there is no economic basis to assume that, under the Order Competition Rule, wholesalers would internalize the same level of order flow, or would provide the same levels of price improvement as they do in the current market

[72] For example, Dyhrberg et al. find that wholesalers with lower realized spreads in a given month tend to attract more order flow in the following month. See Section II.B above.
[73] Order Competition Rule Release, p. 285.

structure, particularly for less liquid stocks. As a result, retail customers would likely receive less price improvement and fewer midpoint executions.

77. It is likely that execution quality for illiquid stocks would deteriorate if the Proposed Rules are implemented. In its Best Ex Rule Proposal, the Commission cautions that "execution prices may be less favorable for retail investors under the proposal if liquidity providers that previously paid for order flow and fulfilled these difficult to execute orders under such arrangements dedicate less capital to making markets in these securities."[74] This concern is warranted. In 2019, the Commission released a statement noting concerns regarding liquidity and high transaction costs for thinly traded stocks,[75] and expressly solicited proposals to improve the market quality of these stocks. It referenced an internal study showing that "approximately one-half of all NMS stocks have an average daily trading volume ('ADV') of less than 100,000 shares."[76]

78. Wholesalers currently provide a non-trivial amount of price improvement for illiquid stocks. By my calculations, in December 2020, Virtu provided price improvement of $0.037 per share on average to fully internalized orders of securities with an average daily volume of 100,000 shares or less, and $0.051 to fully internalized orders with an average daily volume of 50,000 shares or less. The Order Competition Rule Proposal would disincentivize wholesalers from providing the same levels of support for these securities (either through guaranteed execution or price improvement), which could lead to worse execution quality and higher costs for retail investors.

79. Lastly, there is no reason to believe that wholesalers will continue to provide size improvement to the same degree they do today. Under the current market structure, wholesalers have incentives to provide high-quality executions, which includes size improvement. Size

[74] Best Ex Rule Release, pp. 347–348.
[75] Release No. 34-87327, October 17, 2019, pp. 2–3. ("The secondary market for thinly traded securities faces liquidity challenges that can have a negative effect on both investors and issuers. In particular, thinly traded securities, which are often also smaller-capitalization securities, tend to have wider spreads and less displayed size relative to securities that trade in greater volume, often resulting in higher transaction costs for investors. Potential investors in such securities also may be concerned that they could encounter difficulties finding the necessary liquidity to establish or unwind positions in the stocks. A lack of readily available liquidity also may discourage potential market makers from electing to make markets in those securities. For these reasons, a thinly traded security could affect a potential investor's willingness to invest in that issuer's securities, possibly resulting in even fewer trades. Having a less liquid security also could negatively affect an issuer's financing (e.g., the cost of capital)." [Citations omitted]).
[76] "Division of Trading and Markets: Background Paper on the Market Structure for Thinly Traded Securities," *Securities and Exchange Commission*, p. 1, available at https://www.sec.gov/rules/policy/2019/thinly-traded-securities-tm-background-paper.pdf.

improvement occurs when a wholesaler executes more shares than the displayed quantity available at the quote. The Commission acknowledges the value of size improvement in the 605 Rule Proposal and even includes a new field to measure it.[77] Notably, the Commission fails to consider size improvement in the Order Competition Rule Proposal. It is noteworthy that the Order Competition Rule Proposal does not address how auctions eliminate the possibility for wholesalers to offer retail investors size improvement nor how auctions avoid the "walking-the-book" scenario mentioned in the 605 Rule Proposal.[78] From an economic perspective, providing size improvement is another way for wholesalers to build relations and reputations, allowing them to attract more order flow. By failing to account for size improvement and the fact that, in the new regime, wholesalers will not be incentivized to provide it to the same degree, the Order Competition Rule Proposal understates the costs of its rule.

E. Other Issues with the Commission's Economic Analysis

1. For the Tick Size Rule Proposal, the Commission Does Not Adequately Justify Why the Economic Arguments It Relied Upon When Establishing the Current Tick Sizes Are No Longer Applicable and Why a New Tick Size Regime Is Needed

80. As part of the Commission's prior rulemakings, such as the Sub-Penny Rule in 2005, the Commission conducted a substantial amount of research related to tick size and ultimately determined $0.01 to be optimal, reasoning that sub-penny-jumping would undermine execution

[77] The 605 Rule Proposal suggests a size improvement metric that is "the cumulative number of shares of the full displayed size of the protected bid [(offer)] at the time of execution, in the case of a market or limit order to sell [(buy), … which will be] capped at the order size." See 605 Rule Release, p. 131. However, this metric will not clearly differentiate the level of size improvement provided. Specifically, there are a number of orders in which the broker does not have the opportunity to provide size improvement because the order size is equal to or less than the available shares at the NBBO. The Commission's proposal to include all orders in the calculation, even when there is no opportunity to provide size improvement, obfuscates the amount of size improvement provided when the opportunity actually exists. Capping the shares at the order size does not eliminate this problem. As such, this metric is not a reliable measure of the actual size improvement offered and is not as informative as it could be.

[78] The 605 Rule Proposal notes that "[i]nformation about price improvement is different from information about whether orders received an execution of more than the displayed size at the quote, *i.e.*, 'size improvement.' The price improvement metrics currently required by Rule 605 do not necessarily capture a market center's ability to fill orders beyond the liquidity available at the NBBO. For example, consider a situation in which the market is $10.05 x $10.10 with 100 consolidated shares available at the NBO of $10.10 and 100 consolidated shares available at the next best ask price of $10.15. Say that a trader submits a marketable buy order for 200 shares to a market center, which fills the entire order at the best ask price of $10.10. The market center's Rule 605 statistics would reveal a price improvement metric of $0 for this order, despite the fact that the trader saved money by avoiding having to walk the book, which would have resulted in a total price of (100 * $10.10) + (100 * $10.15) = $2,025. As a result of the market center's ability to offer this 'size improvement,' the trader saved an average of $10.125 - $10.10 = $0.025 per share." See 605 Rule Release, pp. 256–257.

priority, deprive the market of liquidity, and cause harm to investors.[79] Additionally, a vast body of academic literature addresses the economics of tick size,[80] going back to the studies of the change in tick sizes from eighths to sixteenths in the late 1990s and then to decimalization in the early 2000s. The Commission considered much of this literature when it adopted the Sub-Penny Rule. While markets have changed and have gotten considerably faster, many of the same underlying economics relevant to tick size remain important considerations. For instance, finer tick sizes could undermine execution priority by tick jumping. In addition, smaller spreads due to finer tick sizes reduce market transparency at the top-of-the-book.

81. When it adopted the Sub-Penny Rule, the Commission reviewed and considered empirical evidence from commenters about the impact of stocks that were tick-constrained at a penny,[81] and ultimately determined that tick-constrained stocks were insufficient to allow sub-penny quoting. In its Tick Size Rule Proposal, the Commission does not explain why its previous analysis is no longer valid. Notably, in passing the Sub-Penny Rule, the Commission said that the rule would deter the practice of "stepping ahead of exposed trading interest by an economically insignificant amount."[82] However, its latest Tick Size Rule Proposal would enable and encourage this practice.

82. Finally, under the current market structure, investors have access to numerous venues, both on- and off-exchange, to execute orders at sub-penny prices. According to the Tick Size

[79] See e.g., Release No. 34-49325, February 26, 2004 ("The Commission believes that OEA's research discussed above strongly suggests that much of the trading that currently takes place in sub-pennies is the result of market participants attempting to step ahead of penny-priced limit orders for the smallest economic increment possible. In the Commission's view, it is unlikely that the high rate of sub-penny clustering around $0.001 and $0.009 price points would have occurred in the absence of stepping ahead behavior. Furthermore, as OEA's research suggests, some sub-penny pricing as well as clustering around the 1 and 9 price points also occurred in increments finer than $0.001, which suggests that sub-penny pricing and the resulting stepping ahead activity could be taken to an absurd extreme. When market participants can gain execution priority for an infinitesimally small amount, important customer protection rules such as exchange priority rules and the NASD's Manning Interpretation as currently formulated could be rendered meaningless. Without those protections, professional traders would have more opportunities to take advantage of non-professionals, which could result in the non-professionals either losing executions or receiving executions at inferior prices. If investors' limit orders lose execution priority for a nominal amount, over time, investors may cease to use them, which would deprive the markets of a vital source of liquidity. Therefore, the use of sub-penny pricing could harm investors and the markets.").

[80] For example, Angel, Harris, and Spatt (2011) mention that "small tick sizes facilitate parasitic quote-matching trading strategies designed to extract option values from standing orders." See James J. Angel, Lawrence E. Harris, and Chester S. Spatt (2011), "Equity Trading in the 21st Century," *Quarterly Journal of Finance*, Vol. 1, No. 1, p. 49.

[81] Release No. 34-51808, June 9, 2005, pp. 353–354 ("A few commenters argued that investors would incur costs from artificially widened spreads as a result of Rule 612. One commenter analyzed trading in six high-volume securities and concluded that Rule 612 would have costs of over $400 million in these securities alone due to wider spreads. Another commenter stated that, if all markets traded QQQQ solely in sub-pennies, the savings would be approximately $150 million per year. A third commenter argued that allowing sub-penny quoting in '23 of the most appropriate securities' would generate annual savings of anywhere between $342 million and $1.9 billion.").

[82] Release No. 34-51808, June 9, 2005, p. 219.

Rule Proposal, tens of billions of dollar volume is executed daily at the midpoint both on- and off-exchange, as well as millions in daily price improvement at smaller increments inside the spread.[83] Moreover, exchange mechanisms that allow for sub-penny prices already exist, and multiple exchanges have already established complementary retail programs, such as the NYSE's Retail Liquidity Program, Nasdaq's Retail Price Improvement Program, and IEX Exchange's Retail Program, which offer sub-penny executions.

2. The Tick Size Rule Proposal Would Result in Less Liquidity at the Top of the Book for Tick Constrained Stocks

83. To justify its proposed changes to the tick size, the Commission uses the Tick Size Pilot ("TSP") by citing the effect of reducing the tick size from $0.05 to $0.01 at the end of the program. The TSP exclusively dealt with small-cap stocks, yet in the Tick Size Rule Proposal the Commission inappropriately extrapolates the observed effects to large-cap stocks.[84] The Commission has not justified its assumption that these different types of securities would have the same impact. In its Tick Size Rule Proposal, it admits that "[u]sing the TSP for analysis also has limitations because the TSP affected a subset of small-cap stocks and primarily focused on changes in tick size."[85] A carefully designed analysis is required to evaluate the impact of the Tick Size Rule Proposal. Trying to extract relevant comparisons from large changes in tick sizes for relatively illiquid stocks is not apples-to-apples, and risks designing changes that could harm liquidity and create other unintended consequences.

84. For tick-constrained stocks, a small tick size would likely result in a tighter spread but would also result in less liquidity at the NBBO because liquidity that is currently concentrated at the penny would be dispersed across the finer pricing increments. This dispersion mechanically reduces liquidity at the top of the book, all else equal. This effect is well documented in the academic literature. For example, Bessembinder (2003) finds that "[after decimalization,] quoted bid-ask spreads declined substantially on [NYSE and Nasdaq]" and that "quotation sizes decreased dramatically after decimalization."[86] Additionally, this effect could be exacerbated by

[83] See Tick Size Rule Release, Table 3.
[84] See Tick Size Rule Release, Table 9.
[85] Tick Size Rule Release, p. 195.
[86] Hendrik Bessembinder (2003), "Trade Execution Costs and Market Quality after Decimalization," *Journal of Financial and Quantitative Analysis*, Vol. 38, No. 4, pp. 747–769.

sub-penny-jumping behavior: Buti, Consonni, Rindi, Yuanji, and Werner (2015) discuss the adverse effects of sub-penny-jumping, including its effects on inside depth: "The SEC realized that if traders could undercut limit orders sitting on the book by an economically insignificant amount, it would potentially reduce the incentive for traders to post limit orders at the top of the [public limit order book], and therefore could have a detrimental effect on inside depth."[87]

85. More depth at the top of the book simplifies order execution, as many executions can be executed as a single trade. If liquidity becomes more dispersed across ticks, the same order may need to be executed with smaller lots, resulting in slower executions and possibly causing information leakage that increases investor costs. Moreover, some market participants make trading decisions using SIP data, which only shows top-of-book data. Because there will be less liquidity at the top of the book, these investors will have less visibility into total market liquidity. Under the Tick Size Rule Proposal, they may need to acquire more expensive depth-of-book data, primarily from exchanges, to see more liquidity.

3. The Best Ex Rule Proposal Would Increase Costs to Market Participants Without Adding a Clear Benefit to Execution Quality

86. The Best Ex Rule Proposal requires broker-dealers to have policies and procedures to identify and incorporate "material potential liquidity sources."[88] Due to the lack of details,[89] brokers could interpret this as a requirement to access additional liquidity sources, even if these new sources provide limited incremental value. At scale, this represents a much larger and unnecessary burden compared to the existing best execution regime and would likely not result in better overall execution quality.

87. An overly strict interpretation of this rule is not necessarily consistent with the well-accepted principles of best execution, which require that brokers use "reasonable diligence."[90] A broker-dealer can determine that it has access to reasonable liquidity sources, such that adding

[87] Sabrina Buti, Francesco Consonni, Barbara Rindi, Yuanji Wen, and Ingrid M. Werner, "Sub-Penny and Queue-Jumping," *Fisher College of Business Working Paper*, p. 4.
[88] See Best Ex Rule Release, pp. 65–66.
[89] See e.g., Best Ex Rule Release, p. 181 ("Although the Commission has not established a set of specific minimum data elements that a broker-dealer would need to acquire to achieve best execution and has acknowledged that it cannot specify the data elements that may be relevant to every specific situation, it has identified the various types of data needed by broker-dealers to fulfill their duty of best execution.").
[90] See "5310. Best Execution and Interposition," FINRA, available at https://www.finra.org/rules-guidance/rulebooks/finra-rules/5310.

access to supplementary liquidity sources might not be worth the cost (*e.g.*, exchanges membership fees, ATS subscriber fees, and other connectivity fees for access).

88. Under the Best Ex Rule Proposal, to comply with the rule requirements, broker-dealers might need to subscribe to data feeds from small trading venues with low liquidity, even though the broker-dealers would not route any meaningful volume to such venues. Subscription costs could become crippling for smaller broker-dealers if they are required to make connections to many or all venues that may offer midpoint liquidity. High costs may cause smaller broker-dealer firms to exit or merge with larger firms, thereby reducing competition. By contrast, smaller trading venues would receive a windfall from simply selling their market data. Ultimately, retail investors would bear these additional costs in the form of poorer execution quality, higher trading costs, and fewer services from their brokers.

89. The Best Ex Rule Proposal also imposes additional requirements on market participants involved in "conflicted transactions," requiring them to evaluate an even broader range of markets beyond those identified as "material." In other words, the rule requires these brokers to assess opportunities at venues they deem not reasonably likely to provide the best prices for customer orders. From an economic perspective, the Commission has decided to effectively levy a penalty on brokers who accept payment for order flow, which would then discourage them from doing so.[91] This could result in higher costs for retail investors, particularly if retail brokers no longer receive payment for order flow and can therefore no longer support commission-free trading. At its core, this is another example of the Commission picking winners and losers without providing meaningful justification for its decisions.

F. The 605 Rule Proposal is the Least Burdensome and Costly of the Proposed Rules and May Achieve All or Most the Stated Goals of the Entire Rule Package

90. As discussed above, the Commission does not provide an adequate justification for the package of rules it proposes (or even for any rule individually). Nevertheless, there is always room at the margin to enhance markets for investors. Among these four proposed rules, there are

[91] See Order Competition Rule Release, p. 300, ("Currently, wholesalers do not charge retail brokers for routing and execution services, and pay some retail brokers PFOF for the right to provide these services. If the implementation of qualified auctions results in a significant loss of wholesaler profits, wholesalers might have to begin charging for routing and execution services. If wholesalers begin charging a fee for routing services, retail brokers would have to absorb this cost and earn lower profits and/or pass on a share of this cost to their customers.").

economic reasons to believe that the 605 Rule Proposal could cost-effectively improve market quality.

91. Currently, it is difficult for investors to compare execution quality across brokers based on Rule 605 and Rule 606 data. The 605 Rule Proposal would require larger brokers to report on order execution quality. This feature would enable investors to better compare execution quality across brokers. The associated increase in transparency would further encourage and motivate brokers to make good routing decisions by allowing them to review wholesaler performance rigorously.

92. As a caveat, it is not apparent that this feature would improve retail execution quality, as the retail broker market is highly competitive, and outcomes could be asymmetric.[92] However, to the extent that there are unexploited opportunities to improve execution quality for retail investors, as the Commission has claimed in its release, empowering investors to compare execution quality across retail brokers (and consequently to switch brokers based on this information) could be the most efficient and effective way to address concerns about execution quality.

93. Compared to the other proposed rules, the 605 Rule Proposal poses the least risk of creating unintended consequences associated with dismantling beneficial elements of the current market structure. For example, one benefit of the 605 Rule Proposal relative to the other rule proposals is that it would not require market participants to reprogram their routing decision logic or their bidding strategies. It also would impose the lowest initial compliance costs, according to the Commission's estimates, as shown in Table 2. Given these reasons, the Commission should consider implementing the 605 Rule Proposal in isolation, measuring the resulting impact (which would establish a new baseline), and then should determine whether there is a need for further changes to the equity market structure relative to the new baseline which could be implemented in pilot programs and in stages.

[92] The proposed rule may change the equilibrium mix of the brokers used by their customers, in ways that can result in positive or negative externalities for other investors. The new rule is designed to allow investors to better compare execution quality across brokers. Based on this information, investors may migrate toward brokers that have better execution quality statistics. As discussed in the other releases, order execution quality tends to be inversely related to how much of a broker's order flow represents "informed" trading (because liquidity providers are willing to provide more price improvement to orders from "uninformed" traders). If the rule induces informed traders to move to brokers that previously had uninformed traders, it could cause execution quality to worsen at that broker.

Table 2: Initial and Annual Compliance Costs of the Proposed Rules[93]

	Initial Compliance Costs	Annual Compliance Costs
605 Rule	$8.9 million	$6.8 million
Order Competition Rule	$48.29 million	$1.99 million
Tick Size Rule	$58.4 million	$0.498 million
Best Ex Rule	$165.4 million	$128.9 million

94. According to its analysis, the Commission believes the 605 Rule Proposal will improve the equity markets, much like it claims its other proposed rules will. For example, the 605 Rule Proposal claims the rule would "better promote competition among market centers and broker-dealers on the basis of execution quality and ultimately improve the efficiency of securities transactions."[94] It also claims that broker-dealers "fac[ing] conflicts of interest that would otherwise misalign their interests with their customers' interest in receiving the best possible execution quality would be better incentivized to manage these conflicts as a result of an increase in their need to compete on the basis of execution quality."[95] If the Commission is correct in its assessment, the problems it claims to have identified regarding competition and conflicts of interest may be fully addressed by its 605 Rule Proposal alone.

[93] See 605 Rule Release, Table 9; Tick Size Rule Release, Table 13; Order Competition Rule Release, Table 21; Best Ex Rule Release, Table 23. Note that Table 23 of the Best Ex Rule Release estimates the initial compliance costs could go as high as $165.4 million if all broker-dealers need to update their policies and procedures to comply with the proposed rule.
[94] 605 Rule Release, p. 5.
[95] 605 Rule Release, p. 319.

Appendix – Supplemental Data Analysis

A. Competitive Dynamics for Wholesalers under the Current Market Structure

1. This section of the appendix includes supplemental analyses highlighting certain competitive factors wholesalers face in today's markets, including an analysis of the types of execution venues retail brokers typically use, which includes multiple wholesalers, exchanges, and ATSs. This section also includes an example of how the market share for the order flow of one particular retail broker has changed over time for various wholesalers.

2. Publicly available Rule 606 data indicate that it is common practice for retail brokers to send their order flow to multiple execution venues, including wholesalers, exchanges, and ATSs. Table A1 contains a list of brokers with a substantial retail customer base and shows the various execution venues they used to execute their customer orders using January 2022 data.

Table A1: Recipients of Order Flow from Select Retail Brokers

		Wholesaler								Exchange						
Retail Broker	Number of Trading Venues	Citadel	G1	IMC	Jane Street	Two Sigma	UBS	Virtu	HRT	Cboe	IEX	MEMX	MIAX Pearl	Nasdaq	NYSE	ATS
Ally Invest	3	✔	✔					✔								
Charles Schwab	9	✔	✔		✔	✔	✔	✔		✔		✔		✔		
E*Trade	8	✔	✔		✔	✔	✔	✔		✔				✔		
Fidelity Investments	10	✔	✔		✔	✔	✔	✔		✔				✔	✔	✔
Interactive Brokers	9	✔							✔	✔	✔	✔	✔	✔	✔	✔
Robinhood	6	✔	✔		✔	✔		✔						✔		
TD Ameritrade	3	✔				✔		✔								
Vanguard	4	✔	✔				✔	✔								
Webull	6	✔		✔	✔	✔		✔		✔						

Source: Rule 606 Reports
Note: The table is based on Rule 606 reports filed by a selection of brokers and shows the trading venues used to route non-directed orders of S&P 500 and non-S&P 500 stocks in January 2022. Some trading venues may be omitted because brokers are not required to list all the venues in their Rule 606 reports. Trading venues operated by the same exchange family (e.g., NYSE and NYSE Arca) are grouped into a single exchange; all ATSs are classified as "ATS."

3. As shown in the table, it is common for a retail broker to route orders to five or more wholesalers in addition to the exchanges and ATSs they use. The data show that some of the largest retail brokers, Charles Schwab, E*Trade, Fidelity, Robinhood, and Webull, used at least five wholesalers, and Ally Invest, TD Ameritrade,[96] and Vanguard used at least three. In addition, retail brokers commonly route to exchanges and ATSs.

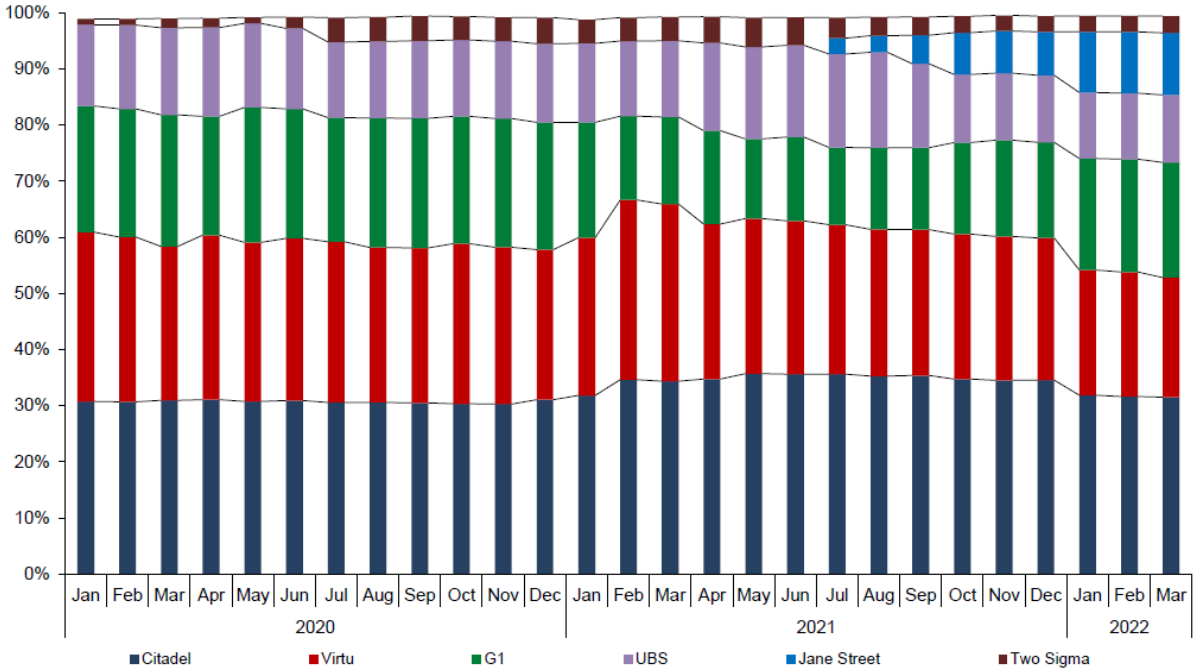
[96] TD Ameritrade was acquired by Schwab, but in January of 2022 (the date for the data used), these firms operated independently.

4. The mix of multiple execution venues that retail brokers use creates a highly competitive environment where wholesalers try to differentiate themselves by providing high-quality order executions. This competition is consistent with how retail brokers describe their relations with wholesalers, and research empirically observes that retail brokers reward wholesalers for providing better execution quality.[97] Rule 606 data can show how retail brokers vary the amount of order flow they send to different wholesalers. Based on my review of these reports, I am not aware of any contract between retail brokers and wholesalers that would guarantee any amount of order flow, suggesting that brokers can add or remove a wholesaler at any time.

5. Figure A1 analyzes the trade flow allocations of Charles Schwab to its wholesalers over approximately two years. In this example, the wholesaler Jane Street first received order flow from Charles Schwab starting in July 2021 and continued to earn larger market share each month through March 2022 (the end of the data sample). The share wholesalers earn in a given month can change considerably over time, even on a monthly basis. For example, in February 2021, G1 appears to have lost a sizable amount of business relative to the prior month, while Citadel and Virtu received higher shares. The opposite occurred in January 2022, when Schwab increased its allocation to G1 and decreased its allocations to Citadel and Virtu. This type of variation in wholesaler market share is expected as retail brokers seek to identify the best execution each month and reallocate order flow accordingly.

[97] See Section III.D.2 in my report.

Figure A1: Charles Schwab's Allocation of Order Flow to Wholesalers
January 2020 – March 2022



Source: Rule 606 Reports
Note: The figure is based on Rule 606 reports filed by Charles Schwab and includes non-directed orders on S&P 500 stocks routed to wholesalers in each month. Market share does not sum to 100% because non-wholesaler venues are not displayed.

6. Table A2 shows the minimum and maximum ranges of market share from Charles Schwab that wholesalers earned from January 2020 through March 2022. In addition, the table shows each wholesaler's largest monthly increase and decrease in terms of market share. For example, G1's share of Schwab's order flow fluctuated from between 13.8% to 24.1%, spanning a factor of nearly 2x. In G1's worst month, it lost 27.4% of its order flow share; in its best month, it gained 16.6%. These factors are more exaggerated with Schwab's smaller wholesalers, such as Two Sigma, who, in its best month, doubled its market share from the prior month, but whose total was at most 5.2%. For Schwab's largest wholesalers, month-to-month variation is less volatile. For example, the best and worst months for Schwab's largest wholesaler, Citadel, translate into a gain of 8.7% or a loss of 7.8% of its order flow share. As discussed in Section III.D.1, these changes are associated with the execution quality the wholesalers provide.

Table A2: Minimum and Maximum Wholesaler Market Share of Charles Schwab's Order Flow, January 2020 – March 2022

	Minimum Share of Broker Order Flow	Maximum Share of Broker Order Flow	Largest Month-Over-Month Positive Change in Share	Largest Month-Over-Month Negative Change in Share
Citadel	30.3%	35.7%	8.7%	7.8%
Virtu	21.3%	32.0%	14.1%	12.5%
G1	13.8%	24.1%	16.6%	27.4%
UBS	11.7%	17.0%	15.5%	18.9%
Jane Street	2.8%	11.0%	72.2%	---
Two Sigma	1.1%	5.2%	119.1%	36.1%

Source: Rule 606 Reports
Note: The table is based on the Rule 606 reports filed by Charles Schwab. It displays summary statistics of the share of non-directed orders on S&P 500 stocks routed to wholesalers. Jane Street is only listed in the retail broker's Rule 606 reports starting in the third quarter of 2021. Data for this wholesaler ranges from July 2021 through March 2022. During this period, its market share of Charles Schwab's order flow consistently increased.

B. Analysis of Virtu's Order and Trade Data

1. Introduction

7. This study analyzes a proprietary dataset from Virtu, which operates one of the largest wholesaler businesses. The dataset consists of fully filled market orders and marketable limit orders routed to Virtu in December 2020 and includes 7,817 different tickers.[98] Analyzing this dataset allows for insights not available when using public data. For example, the dataset contains more granular information than Rule 605 reports, which aggregate monthly data and exclude odd lots. Additionally, the dataset contains more information than the consolidated SIP data, such as the actual trade direction, which allows for a more accurate analysis of price improvement.[99]

8. The focus of this study is to analyze the execution quality of wholesaler orders. A summary of the analysis shows that in December of 2020:

a. Over 54 million orders were routed to Virtu, representing 20.6 billion shares. Virtu fully internalized 85.5% of the orders, equating to 59.6% of the shares. Virtu also sourced liquidity ("externalized") from exchanges, ATSs, and other venues. It fully externalized 12.9% of the orders (or 16.7% of the shares), and partially internalized the remaining 1.6% (or 23.7% of the shares).

b. Virtu provided approximately $95 million in price improvement to its fully internalized orders. Virtu supplemented its price improvement for non-internalized orders by contributing over $7.8 million of its capital for the month.[100] Most of the supplemental price improvement ($6.8 million) was provided to orders routed to the exchanges either fully or in part.

c. Fully internalized orders received higher rates of price improvement and midpoint executions relative to fully or partially externalized orders. Specifically, 78.7% of fully internalized orders received price improvement, and 49.1% were executed at

[98] December 2020 is intended to represent a typical month of market activity. Unfilled and partially filled orders were excluded from the data. To exclude items such as tradable rights, warrants, preferred stocks, and other non-standard securities, only tickers that are reported by CRSP (which excludes many of these) were included. This filtering step does not meaningfully alter the results of the analysis.

[99] Studies relying on public sources typically use the Lee-Ready method to infer trade direction, designating a buy (sell) trade if its price is higher (lower) than the midpoint. This method, by design, will mis-categorize any trades executed at a price better than the prevailing midpoint price.

[100] The analysis does not include the fees that Virtu paid to exchanges and ATSs to obtain liquidity.

the midpoint. Of the fully externalized orders, 39.4% received price improvement, and 9.4% were executed at the midpoint. However, after factoring in supplemental price improvement, 75.3% of fully externalized orders received price improvement, and 9.6% were executed at the midpoint.

d. The partially internalized orders are the largest by average share size and average dollar volume. In terms of average share size, these orders are approximately 20 times larger than fully internalized orders and 10 times larger than fully externalized orders. When executing a large order, particularly one that exceeds the shares available at the quote, the market may move before the order fully executes, resulting in "negative" price improvement, even when the order is executed optimally. Large orders may include institutional activity, implying that measures of conventional price improvement may not be informative for these orders.

e. There is a direct relation between the order size, the time taken to execute the order, and the price improvement the order receives. Across all order categories, larger orders are on average associated with longer execution time and less price improvement. The largest orders are most likely to exceed the displayed quantity at the NBBO.

2. Detailed Analysis of Virtu's Wholesaler Data

9. Virtu received 54.3 million orders in December 2020, which equated to 20.6 billion shares and $604.4 billion in dollar volume. Virtu internalized 85.5% of these orders and found external liquidity sourced from exchanges, ATSs, and other off-exchange venues, for 12.9% of its orders.[101] Virtu partially internalized 1.6% of the orders, meaning liquidity was sourced for some of the shares externally while other shares were internalized. Even though these orders only make up 1.6% of all orders, they represent 23.7% of all shares, indicating they are disproportionately large relative to fully internalized and fully externalized orders. Partially internalized orders were by far the largest—over 10 times the size of fully externalized orders

[101] Off-exchange orders include those executed on ATSs, single dealer platforms, and any other bilateral trading. The limited number of trades that are missing an execution venue are classified as externalized trades.

and over 20 times the size of fully internalized orders. Virtu's order type data and the number of shares are reported in Table A3.

Table A3: Summary of Virtu's December 2020 Orders

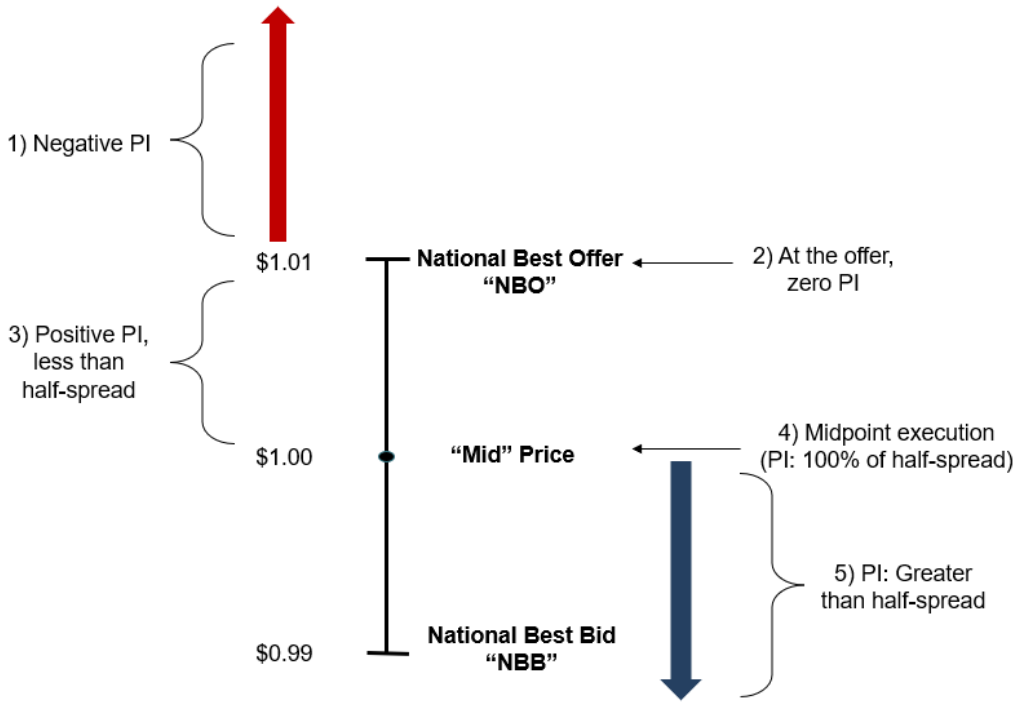
Orders	Number of Orders	% of Total	Number of Shares	% of Total	Average Shares per Order	Dollar Volume ($ Millions)	% of Total
Internalized	46,428,949	85.5%	12,258,712,264	59.6%	264	$442,659	73.2%
Partially Internalized	843,791	1.6%	4,869,810,174	23.7%	5,771	$90,177	14.9%
Externalized	6,999,509	12.9%	3,433,684,046	16.7%	491	$71,603	11.8%
Total	**54,272,249**	**100.0%**	**20,562,206,484**	**100.0%**	**379**	**$604,440**	**100.0%**

Source: Virtu Data
Note: The table summarizes the fully executed marketable orders of Virtu in December 2020, excluding tickers that cannot be found in CRSP data as of December 2020.

10. The following analysis measures Virtu's order execution quality in terms of price improvement, based on a percentage of the half spread (i.e., the distance from the market best quote to the midpoint) and time elapsed for the order to fully execute. Figure A2 visually illustrates the various price improvement zones for a buy order, all relative to the NBBO at order arrival time. All zones represent the total price improvement after the order has been fully executed, even when multiple trades are needed to complete the order.[102] The figure shows five zones: (1) when a buy order executes at a price higher than the NBO at order arrival time, price improvement is negative; (2) when a buy order executes at the NBO, price improvement is zero; (3) when a buy order executes below the NBO but above the midpoint, price improvement is positive but less than the half spread; (4) when a buy order executes at the midpoint, price improvement is 100% of the half spread; and (5) when a buy order executes below the midpoint, price improvement is more than the half spread.

[102] Similar logic would apply to a sell order.

Figure A2: Illustrative Diagram of Price Improvement Zones for a Buy Order



11. Table A4 summarizes the distribution of Virtu's December 2020 orders across these five zones, broken out by fully internalized, partially internalized, and fully externalized orders.

Table A4: Distribution of Price Improvement for Virtu's December 2020 Orders

						Percent of Orders Falling Within				
	Number of Orders	Average Order Size	Median Order Size	Average Seconds Elapsed from Order to Execution	Median Seconds Elapsed from Order to Execution	Greater than Half-Spread	Midpoint Execution	Less than Half-Spread	Zero	Negative
Internalized	46,428,949	264	21	0.18	0.01	2.6%	49.1%	27.0%	20.5%	0.8%
Partially Internalized	843,791	5,771	1,400	22.26	0.03	3.5%	2.6%	56.5%	9.7%	27.7%
Externalized	6,999,509	491	65	8.04	0.02	2.6%	9.6%	63.1%	20.9%	3.8%
All	**54,272,249**	**379**	**25**	**1.53**	**0.01**	**2.6%**	**43.3%**	**32.1%**	**20.4%**	**1.6%**

Source: Virtu Data
Note: An order's time elapsed measures the duration between its receipt and its last trade execution.

12. Notably, 43.3% of all Virtu's orders were executed at the midpoint, constituting 49.1% of fully internalized orders, 2.6% of partially internalized orders, and 9.6% of fully externalized orders. Additionally, 78.0% of all orders received at least some degree of price improvement (i.e., transacting above the NBB for a sell order or below the NBO for a buy order).[103]

[103] This figure is calculated by summing the following: orders receiving price improvement greater than the half-spread (2.6%), midpoint execution (43.3%), and orders receiving positive price improvement lower than the half-spread (32.1%).

Approximately 1.6% of Virtu's orders had negative price improvement, the lion's share of which is attributable to the largest orders that require more liquidity—*i.e.*, from the partially internalized orders.

13. Table A4 also shows the average and median order execution times (elapsed time from order receipt to full execution). The fully internalized orders are executed the fastest, with a median execution time of 0.01 seconds, followed by the fully externalized orders, with a median execution time of 0.02 seconds, and finally, by the partially internalized orders, with a median execution time of 0.03 seconds. Notably, the median order execution time across order types is significantly shorter than the 100 to 300 milliseconds proposed time duration for the qualified auctions in the Order Competition Rule Proposal. Average order execution times are substantially longer than median execution times, particularly for the non-internalized orders, indicating the presence of outliers in the data that took a long time to execute.

14. Academics have acknowledged how conventional measures of execution quality for large orders that may exhaust the available liquidity at the top of the book may be misleading and show "disimprovement" even when such a large order is executed against standing orders in the limit order book.[104] Therefore, this analysis includes both gross price improvement statistics, which excludes any negative price improvement from an order and which may be more appropriate for large orders, and net price improvement statistics, which include all orders regardless of whether the price improvement is positive or negative. Table A5 reports aggregated statistics of price improvement measured in average and median dollars per order, the percentage of the half spread captured, and in basis points relative to the dollar value of the order.

[104] See e.g., Jeffrey M. Bacidore, Robert H. Battalio, and Robert H. Jennings (2002), "Depth improvement and adjusted price improvement on the New York stock exchange," *Journal of Financial Markets*, Vol. 5, No. 2.

Table A5: Price Improvement on Virtu's December 2020 Orders

	Gross Price Improvement					Net Price Improvement				
	Total ($)	Average per Order	Median per Order	% Half-Spread	Basis Point of $ Value	Total ($)	Average per Order	Median per Order	% Half-Spread	Basis Point of $ Value
Internalized	$100,384,384	$2.16	$0.04	48.0%	2.27	$95,020,794	$2.05	$0.04	45.5%	2.15
Partially Internalized	$8,981,723	$10.64	$0.25	21.7%	1.00	-$39,602,985	-$46.93	$0.25	-95.8%	-4.39
Externalized	$14,807,658	$2.12	$0.03	43.5%	2.07	-$543,103	-$0.08	$0.03	-1.6%	-0.08
All	**$124,173,766**	**$2.29**	**$0.04**	**43.7%**	**2.05**	**$54,874,706**	**$1.01**	**$0.04**	**19.3%**	**0.91**

Source: Virtu Data
Note: The gross price improvement statistics account for orders executed at better prices than the NBBO, i.e., with non-negative price improvements, and assume those executed at or outside the NBBO receive zero price improvement. The net price improvement statistics assume negative price improvement for orders executed outside the NBBO.

15. There is little difference between gross and net price improvement for the fully internalized orders because most have positive price improvement. Additionally, order size tends to be smaller than externalized (either fully or partially). Based on net price improvement, internalized orders capture 45% of the half-spread and average $2.05 per order or 2.15 basis points. On net, internalized orders included $95 million in price improvement.

16. For the fully externalized orders, the total dollar amount of net price improvement is negative $0.5 million. Notably, this figure reflects supplemental price improvement, meaning Virtu used its capital to improve realized execution prices. Without this supplemental price improvement, net price improvement would have been negative $5.9 million. The average price improvement per order was negative $0.08; however, the median price improvement per order was positive $0.03.

17. For partially internalized orders, net price improvement was significantly negative ($40 million). However, given the large size of these orders (10x larger than fully externalized orders and 20x larger than fully internalized orders), gross price improvement may be more informative. For example, many of these orders may have been submitted by institutions which trade in large quantities. To the extent this was the case, conventional price improvement metrics are less relevant for institutions that evaluate execution quality based on implementation

shortfall, VWAP averages relative to another benchmark, or slippage.[105] The gross price improvement for partially internalized orders totaled approximately $9 million.

18. When order size exceeds the amount of liquidity available at the NBBO, wholesalers, in some cases, may be willing to offer more shares at or better than the quote that is publicly displayed. In other cases, wholesalers may seek to execute some or all of the order on the exchanges. Because there is insufficient liquidity available to fill the entire order at the NBBO, a portion of the order may be executed at the next best price(s). Additionally, larger orders may need to be broken up into smaller pieces and routed to multiple venues to obtain the best execution, and therefore may take longer to execute. For these reasons, there is an inverse relation between order size and the price improvement the order receives.

19. Table A6 shows the distribution of price improvement by order size measured in shares for internalized and non-internalized orders.[106] Generally, as the order size increases, the average execution time and the rate of "disimproved" orders (i.e., orders with negative price improvement) increases. Internalized orders showed the lowest rates of negative price improvement, totaling 0.6% for the smallest orders, to 1.9% for the largest orders of 5,000 or more shares. Midpoint executions similarly decreased from 52.2% to 13.8%, and orders executed at the quote increased from 21.0% to 36.5%. For fully externalized orders, the smallest orders had a negative price improvement rate of 2.7%. The rate of negative price improvement generally increased for each order size, with a rate of 20.3% for the largest order bucket.

[105] Schwab white paper, p. 7 ("[I]nstitutional trades are more likely to 'move the market' – which is why their execution quality is often measured based on slippage from the NBBO, as opposed to price improvement within it").

[106] The buckets of share sizes are the same as those reported in Rule 605 reports, but also include odd lots, and orders at or larger than 10,000 shares.

Table A6: Distribution of Price Improvement for Virtu's December 2020 Orders

Internalized							Average Seconds	Median Seconds	Percent of Orders Falling Within				
Order Size (Shares)	Number of Orders	% of Total Orders	Number of Trades	% of Total Trades	Number of Shares	% of Total Shares	Elapsed from Order to Execution	Elapsed from Order to Execution	Greater than Half-Spread	Midpoint Execution	Less than Half-Spread	Zero	Negative
1 - 99	31,858,742	68.6%	32,252,971	66.8%	540,922,315	4.4%	0.15	0.01	2.2%	52.2%	24.0%	21.0%	0.6%
100 - 499	9,244,290	19.9%	9,808,188	20.3%	1,712,501,151	14.0%	0.19	0.01	3.6%	45.5%	30.9%	18.9%	1.1%
500 - 1,999	3,928,109	8.5%	4,415,245	9.1%	3,342,543,518	27.3%	0.21	0.01	3.9%	43.4%	33.1%	18.4%	1.2%
2,000 - 4,999	929,860	2.0%	1,127,672	2.3%	2,482,550,989	20.3%	0.32	0.01	1.6%	23.3%	53.6%	20.1%	1.3%
5,000 or greater	467,948	1.0%	654,870	1.4%	4,180,194,291	34.1%	1.30	0.01	2.1%	13.8%	45.7%	36.5%	1.9%

Partially Internalized							Average Seconds	Median Seconds	Percent of Orders Falling Within				
Order Size (Shares)	Number of Orders	% of Total Orders	Number of Trades	% of Total Trades	Number of Shares	% of Total Shares	Elapsed from Order to Execution	Elapsed from Order to Execution	Greater than Half-Spread	Midpoint Execution	Less than Half-Spread	Zero	Negative
1 - 99	59,525	7.1%	144,281	1.8%	2,147,066	0.0%	9.79	0.01	4.7%	2.2%	68.5%	13.0%	11.6%
100 - 499	138,607	16.4%	461,461	5.6%	35,084,108	0.7%	8.48	0.02	4.6%	4.5%	63.4%	11.7%	15.8%
500 - 1,999	264,005	31.3%	1,460,145	17.7%	252,892,184	5.2%	13.75	0.02	3.5%	3.9%	64.0%	7.8%	20.7%
2,000 - 4,999	156,364	18.5%	1,486,720	18.1%	442,613,981	9.1%	25.32	0.03	2.4%	1.8%	55.6%	7.0%	33.2%
5,000 or greater	225,290	26.7%	4,681,713	56.9%	4,137,072,835	85.0%	41.83	0.04	3.2%	0.4%	41.0%	11.8%	43.6%

Externalized							Average Seconds	Median Seconds	Percent of Orders Falling Within				
Order Size (Shares)	Number of Orders	% of Total Orders	Number of Trades	% of Total Trades	Number of Shares	% of Total Shares	Elapsed from Order to Execution	Elapsed from Order to Execution	Greater than Half-Spread	Midpoint Execution	Less than Half-Spread	Zero	Negative
1 - 99	3,763,859	53.8%	4,112,030	26.7%	86,288,754	2.5%	10.01	0.01	2.6%	7.4%	65.0%	22.3%	2.7%
100 - 499	2,039,925	29.1%	3,715,360	24.1%	375,370,572	10.9%	4.12	0.02	2.9%	14.9%	59.3%	20.2%	2.7%
500 - 1,999	843,823	12.1%	3,934,473	25.5%	719,123,646	20.9%	5.20	0.02	2.4%	8.4%	67.2%	15.9%	6.0%
2,000 - 4,999	203,316	2.9%	1,740,860	11.3%	543,939,490	15.8%	13.24	0.02	2.4%	5.8%	60.9%	18.2%	12.7%
5,000 or greater	148,586	2.1%	1,917,873	12.4%	1,708,961,584	49.8%	21.08	0.02	2.7%	5.1%	45.7%	26.3%	20.3%

Source: Virtu Data
Note: An order's time elapsed measures the duration between its receipt and its last trade execution.

20. Because larger orders take more time to execute fully, the market price often moves away from the quote established when the order initially arrived. Additionally, the number of shares demanded often exceeds the available shares reported at the NBBO, meaning the order is more likely to move prices because it can have a greater market impact if it depletes the available liquidity. When this happens, price improvement appears negative, even though the order was executed at the best available prices.

21. Table A7 illustrates an example of a buy order for 5,400 shares of the ticker AMLP on December 15, 2020, that was fully externalized and the accompanying trades that completed the order. This example shows how the trade price worsened as liquidity was removed from the market. The first two trades, each for 100 shares, were executed at the midpoint price of $27.575. These trades were followed by 20 trades totaling 4,023 shares executed at the NBO of $27.580. Finally, five trades totaling 1,177 shares were executed at the next best price of $27.585. Together, these trades completed the order of 5,400 shares. However, the order's volume-weighted price is worse than the quote at the time of the order receipt, meaning the order is associated with negative price improvement, even though the average execution price of $27.581 is better than the VWAP of the displayed shares, which is $27.587.

Table A7: Example of a Large Order with Price Impact

Order Details

Date	Timestamp	Ticker	Buy/Sell	Volume (in shares)	Average Execution Price	NBB	NBO	Shares at NBB	Shares at NBO	VWAP of Displayed Shares	Total 605 PI
12/15/2020	11:28:15.590	AMLP	B	5,400	$27.581	$27.57	$27.58	3,499	1,723	$27.587	-$4.89

Trade Details

Number	Date	Timestamp	Ticker	Quantity	Execution Price	Execution Venue
1	12/15/2020	11:28:15.599	AMLP	100	$27.575	Off-Exchange Venue
2	12/15/2020	11:28:15.600	AMLP	100	$27.575	Off-Exchange Venue
3	12/15/2020	11:28:15.608	AMLP	300	$27.580	Off-Exchange Venue
4	12/15/2020	11:28:15.609	AMLP	300	$27.580	Off-Exchange Venue
5	12/15/2020	11:28:15.609	AMLP	300	$27.580	Off-Exchange Venue
6	12/15/2020	11:28:15.610	AMLP	300	$27.580	Off-Exchange Venue
7	12/15/2020	11:28:15.610	AMLP	300	$27.580	Off-Exchange Venue
8	12/15/2020	11:28:15.610	AMLP	200	$27.580	Off-Exchange Venue
9	12/15/2020	11:28:15.610	AMLP	200	$27.580	Off-Exchange Venue
10	12/15/2020	11:28:15.611	AMLP	100	$27.580	Off-Exchange Venue
11	12/15/2020	11:28:15.611	AMLP	300	$27.580	Off-Exchange Venue
12	12/15/2020	11:28:15.611	AMLP	300	$27.580	Off-Exchange Venue
13	12/15/2020	11:28:15.611	AMLP	100	$27.580	Off-Exchange Venue
14	12/15/2020	11:28:15.612	AMLP	100	$27.580	Exchange
15	12/15/2020	11:28:15.612	AMLP	300	$27.580	Exchange
16	12/15/2020	11:28:15.612	AMLP	100	$27.580	Exchange
17	12/15/2020	11:28:15.612	AMLP	100	$27.580	Exchange
18	12/15/2020	11:28:15.613	AMLP	3	$27.580	Exchange
19	12/15/2020	11:28:15.613	AMLP	100	$27.580	Exchange
20	12/15/2020	11:28:15.613	AMLP	20	$27.580	Exchange
21	12/15/2020	11:28:15.613	AMLP	500	$27.580	Exchange
22	12/15/2020	11:28:15.614	AMLP	100	$27.580	Exchange
23	12/15/2020	11:28:15.623	AMLP	100	$27.585	Off-Exchange Venue
24	12/15/2020	11:28:15.623	AMLP	300	$27.585	Off-Exchange Venue
25	12/15/2020	11:28:15.624	AMLP	200	$27.585	Exchange
26	12/15/2020	11:28:15.624	AMLP	300	$27.585	Exchange
27	12/15/2020	11:28:15.625	AMLP	277	$27.585	Exchange

Source: Virtu Data

22. For orders filled with liquidity sourced from exchanges and other off-exchange venues, Virtu supplements the price improvement using its capital. Table A8 shows that in December 2020, Virtu paid $7.8 million to improve the execution quality of its non-internalized orders. The majority was provided to fully externalized orders and nearly eliminated the net negative price improvement for this type of order. Less supplemental price improvement was provided to partially internalized orders which represent a much smaller percentage of Virtu's orders. Out of the $7.8 supplemental price improvement, $6.8 million was provided to orders—either fully or partially—routed to exchanges. When all orders are viewed in aggregate, Virtu provided approximately $55 million in price improvement to customer orders in December 2020.

Table A8: Supplemental Price Improvement by Virtu for Its December 2020 Orders

	Internalized			Externalized			Partially Internalized			Overall	
	PI ($ million)	Average Size Per Order (in Shares)	PI Per Share	PI ($ million)	Average Size Per Order (in Shares)	PI Per Share	PI ($ million)	Average Size Per Order (in Shares)	PI Per Share	PI ($ million)	PI Per Share
PI Before Supplement	$95.0	264	$0.0078	-$5.9	491	-$0.0017	-$42.0	5,771	-$0.0086	$47.1	$0.0023
Supplemental PI	--	--	--	$5.3	491	$0.0016	$2.4	5,771	$0.0005	$7.8	$0.0009
Total	**$95.0**	**264**	**$0.0078**	**-$0.5**	**491**	**-$0.0002**	**-$39.6**	**5,771**	**-$0.0081**	**$54.9**	**$0.0027**

Source: Virtu Data