

February 14, 2024



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Ms. Vanessa Countryman, Secretary
U.S. Securities and Exchange Commission
100 F Street NE
Washington, DC 20549

Re: Volume-Based Transaction Pricing for NMS Stocks, File No. S7-18-23, Release No. 34-98766

Dear Ms. Countryman:

In connection with the above-referenced rulemaking, Nasdaq, Inc. submits the attached comment, which is a research report prepared by Professor Terrence Hendershott of the University of California at Berkeley entitled "Volume-Based Transaction Pricing for NMS Stocks."

Sincerely,

A handwritten signature in black ink that reads "Brett Kitt".

Brett Kitt

Cc: The Honorable Gary Gensler, Chairman, SEC
The Honorable Caroline A. Crenshaw, Commissioner, SEC
The Honorable Hester M. Peirce, Commissioner, SEC
The Honorable Jaime Lizárraga, Commissioner, SEC
The Honorable Mark T. Uyeda, Commissioner, SEC
Director Haoxiang Zhu, Division of Trading and Markets

Volume-Based Transaction Pricing for NMS Stocks

Professor Terrence Hendershott¹

February 14, 2024

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I. Executive Summary

1. On October 18, 2023, the Securities and Exchange Commission (“SEC” or “the Commission”) proposed a new Rule 6b-1 under the Exchange Act (“Proposed Rule”) prohibiting securities exchanges from using volume-based trading fees and rebates for agency and riskless principal orders.²

2. This paper discusses the economics of the Proposed Rule, focusing on its likely impact on competition across market venues and brokers, and its likely impact on liquidity, market efficiency, and capital formation. It identifies economic considerations overlooked or treated inconsistently in the Proposing Release and explores implications of the SEC’s own economic analysis. It also provides new analysis based on Nasdaq data and suggests additional analyses necessary for the SEC to evaluate the Proposed Rule.

3. The Proposing Release’s economic analysis does not support a conclusion that this Proposed Rule is in the public interest or consistent with the Exchange Act’s goals. The SEC’s “concerns” that volume-based pricing may be a burden to competition are not supported by any of the evidence they present or widely accepted economic principles, and do not provide an economic justification for the Proposed Rule.

4. Contrary to the SEC’s concerns, volume-based pricing is unlikely to harm competition between trading venues. Volume-based pricing is widely viewed by economists as pro-competitive and welfare-enhancing in most instances. The structure and characteristics of the market for trading venues are such that volume-based pricing, in this specific context, is particularly likely to be pro-competitive, not anti-competitive. For example, and as the SEC itself recognizes, larger exchange members generate positive “liquidity externalities” for smaller members, including tighter spreads and lower trading costs. Thus, volume-based pricing serves as a fair and efficient way in which exchanges can incentivize and compensate large members for the positive externalities they generate.

5. Notwithstanding the SEC’s stated concerns about the anti-competitive effects of exchanges tying closing auction fees to volume in the continuous market, the economic literature

² Securities and Exchange Commission, “Volume-Based Exchange Transaction Pricing for NMS Stocks,” Release No. 34-98766 (“Proposing Release”).

on tying and bundling shows that these practices are likely to be pro-competitive in this instance. Linking auction and continuous trading fees is a weak form of bundling that is unlikely to be anti-competitive. Section II addresses these topics.

6. The SEC has a misplaced concern that volume-based pricing may be harmful to smaller brokers, making it harder for them to compete for customers. The vast majority of smaller brokers outsource their order routing and execution to larger executing brokers. Healthy competition exists among executing brokers for this business result in large executing brokers passing through some or all of the benefits of the volume tiers on to the smaller brokers. Thus, increasing fees for the largest exchange members who are executing brokers is likely to harm, not benefit, the smaller brokers who route through them. Section III addresses these topics.

7. The SEC's own economic analysis recognizes that the Proposed Rule may induce displayed liquidity to migrate off-exchange, and this may have adverse effects on market quality, market efficiency, and capital formation. A significant reduction in displayed liquidity would likely result in wider National Best Bid and Offer ("NBBO") spreads and have negative implications for execution quality, price discovery, market efficiency, and capital formation. The Proposing Release mentions these effects as theoretical possibilities but does not provide any quantitative analysis evaluating how important these effects may be. My analysis of Nasdaq data shows that the potential amount of liquidity at risk of migrating off-exchange is large. Roughly three quarters of transactions on Nasdaq have liquidity provided by members who qualify for the highest liquidity rebates, with roughly two-thirds of that from agency orders. These members also provide about 70% of Nasdaq's quoted depth at the NBBO. Lower rebates due to an elimination of volume-based pricing would provide strong economic incentives for larger members to move their displayed liquidity off-exchange. Such a move would significantly harm liquidity, market efficiency, and capital formation. Section IV presents this analysis.

8. High-quality analysis is crucial to ensure that SEC rules are in the public interest and are consistent with the mission of the SEC and its statutory goals. Section V shows that, unfortunately, the Proposing Release does not meet the SEC's own internal guidance for conducting high-quality economic analyses. The SEC's economic analysis fails to justify why rulemaking is needed and to consider the effects of several other rules the SEC has already proposed but not yet adopted. The economic analysis presented in the Proposing Release finds

that the rule is likely to have adverse effects on efficiency and capital formation and fails to identify any meaningful benefits that might justify adopting the rule despite these adverse effects. Moreover, the SEC's analysis of competition is flawed and the only attempt to quantify the effects of the rule ignores relevant factors such as the potential loss of liquidity externalities and the impact of off-exchange migration. In summary, the economic analysis as currently formulated provides no justification for a conclusion that any rule is needed, or that passing the Proposed Rule would be consistent with the goals of the SEC.

II. Volume-based pricing is not harmful to competition across trading venues.

9. Volume-based pricing has been offered on trading venues for decades and economists generally understand it to be pro-competitive, except under a narrow set of circumstances that do not appear to apply here. Given the institutional structure of equity trading platforms, the nature of broker-dealers who intermediate trading, and the investors who use those platforms, volume-based pricing is likely to be pro-competitive in this context. Volume-based pricing compensates large exchange members for positive liquidity externalities, and encourages their participation, which benefits all the market participants on a given trading venue. Moreover, the SEC's concerns about anti-competitive tying of the auction and the continuous market are unfounded in this context.

10. For many years, liquidity rebates have been one of the primary ways that exchanges compete with each other and with off-exchange trading venues to attract liquidity providers and order flow. As the SEC recognizes in the Proposing Release, volume-based liquidity rebates create an incentive for liquidity providers to concentrate liquidity on an exchange. Establishing a critical mass of liquidity is an important part of making an exchange attractive to brokers as a routing destination, and volume-based pricing is one of the main tools that exchanges use to try to achieve this. Attracting liquidity makes an exchange more effective at bringing buyers and sellers together, which in turn is related to its attractiveness as a platform for firms to issue shares and raise capital (*i.e.*, capital formation).

11. Historically, before the exchanges demutualized in the 1990s and early 2000s, exchanges were owned by broker-dealer members, and the members' ownership stake gave them an incentive to provide liquidity as market makers on the exchange, and to route agency order flow

there. Today, most exchanges are not owned by members, and the exchanges compete with their own members (or potential members) for order flow—specifically, exchanges compete against alternative trading systems (“ATs”) that are owned and operated by broker-dealers who route customer order flow, and against broker-dealers acting as off-exchange market makers. Concurrent with the trend of demutualization in the late 1990s and 2000s, liquidity rebates evolved as an alternative mechanism to attract liquidity providers, and thereafter became a primary dimension on which exchanges compete.

12. As the SEC recognizes, volume-based pricing creates an incentive for certain members to focus trading volume on specific exchanges. However, such focus by certain members does not imply that the market is not competitive or that investors are harmed. Different liquidity providers may choose to send more liquidity to different exchanges for a variety of reasons, and this can result in multiple trading venues capturing market share and competing vigorously with each other. Indeed, the evidence presented below regarding the degree of concentration across exchanges and other trading venues indicates that current competition is strong.³

13. Because liquidity rebates, including volume-based pricing, are one of the dimensions on which exchanges compete for order flow, there are obvious reasons to believe that prohibiting them could have adverse implications for competition across exchanges, and competition between exchanges and off-exchange venues. The Proposing Release, however, lacks any serious consideration of the role volume-based pricing plays in promoting competition across trading venues. The Proposing Release focuses mainly on the potential effects of volume-based pricing on larger versus smaller brokers and whether it affects their relative strength as competitors. With respect to competition across exchanges, the Proposing Release discusses potential implications of linking auction pricing to volume in the continuous market (without undertaking any empirical analysis) but does not address the main question of whether prohibiting volume-based pricing would be a burden to competition across trading venues.

14. The economic literature and data I have examined supports a conclusion that exchange volume-based pricing is more likely to promote than hinder competition across trading venues.

³ Based on data from Q3 2023, I estimate the HHI to be 677, where the market is defined to include exchanges, ATs, and non-ATS off-exchange trading venues.

Thus, prohibiting it could be viewed as interfering with or placing a burden on competition. With respect to competition across trading platforms:

- a. Volume-based pricing is ubiquitous across the economy in many industries, and is almost always viewed as pro-competitive, not anti-competitive. (See Section II.A.)
- b. The market for trading venues has the characteristics of a competitive market, with a large number of competitors, low concentration, a history of successful new entrants, and a regulatory framework that strongly encourages trading venues to compete on execution quality. The market does not exhibit the conditions under which volume-based pricing might be anti-competitive. (See Section II.B.)
- c. Aggregating liquidity on a trading venue generates positive liquidity externalities that reduce search and trading costs and makes a venue more attractive to other market participants. Thus, in addition to being a way for exchanges to compete with each other, volume-based pricing may be an efficient way to compensate larger members for these positive externalities. (See Section II.C.)
- d. The SEC's concerns with linking fees in the closing auction to volume in the continuous market are not well-founded. Bundling is pro-competitive and welfare-enhancing in most situations, and the rare exceptions to this principle do not appear to apply in this market. (See Section II.D.)

A. Volume-based pricing is generally pro-competitive.

15. The economics of volume-based pricing has been analyzed extensively in the economic literature. The conclusions of this research are widely accepted, uncontroversial, and provide a strong economic basis for policy. The academic literature finds that volume-based pricing is generally pro-competitive and welfare-enhancing.⁴ Under fixed pricing, each unit of a good must

⁴ Economists consider volume-based pricing to be a type of exclusionary vertical agreement (agreements between sellers and buyers), which are anti-competitive only under limited circumstances. Douglas Bernheim and Randal Heeb, "A Framework for the Economic Analysis of Exclusionary Conduct," in *The Oxford Handbook of International Antitrust Economics*, Volume 2 (Oxford University Press, 2014), pp. 3–39 ("Bernheim and Heeb (2014)"), p. 5 ("Potentially exclusionary practices that do not involve exclusionary conditions include predatory pricing, simple bundling, volume discounts, and conventional tying.") and pp. 8–9 ("In the absence of NCEs [negative contracting externalities], vertical agreements that exclude rivals are generally procompetitive. . . . [E]xclusionary agreements will emerge only if they are both socially beneficial, in the sense that they maximize total economic benefits to all members of society, and beneficial to customers.").

be sold at the same price, which is determined by the equilibrium between market demand and supply. However, this can leave potential welfare-improving transactions on the table because some buyers and sellers may be willing to transact more volume at a lower price.⁵ As long as the net price exceeds the marginal cost to the firm, both the consumers and the firm have the incentive to contract for a higher quantity at a lower price, and doing so increases total surplus, which is a pro-competitive outcome.⁶

16. Because volume-based discounts are generally pro-competitive, the academic literature recommends that for policy purposes, a high bar be set for determining whether volume-based pricing has anti-competitive effects.⁷ In particular, economists have concluded that volume discounts “*always* have a procompetitive justification” and “virtually all have a procompetitive benefit,” except under specific circumstances described below.⁸ Given this general finding in the literature, it behooves the SEC (or any regulator) to identify specific anti-competitive uses of volume discounts in the relevant markets before moving to ban them.⁹

⁵ Kevin Murphy et al., “Competitive Discounts and Antitrust Policy,” *The Oxford Handbook of International Antitrust Economics*, Volume 2, 2014, pp. 89–119 (“Murphy et al. (2014)”), p. 94 (“Simple linear pricing (‘here’s my price, buy what you want’) leaves unrealized gains from trade and, therefore, establishes incentives for buyers and sellers to devise ways to unlock them.”).

⁶ Murphy et al. (2014), p. 98 (“[T]here are mutual gains for a buyer and a seller from an agreement that offers a discount in exchange for a buyer’s commitment to purchase more.”); Chiara Fumagalli and Massimo Motta, “On the Use of Price-Cost Tests in Loyalty Discounts and Exclusive Dealing Arrangements: Which Implications from Economic Theory?,” BAFIR CAREFIN Centre Research Paper Series, 2016(36), p. 6 (“However, when price is the clearly predominant mechanism of exclusion, the price-cost test tells us that, so long as the price is above-cost, the procompetitive justifications for, and the benefits of, lowering prices far outweigh any potential anticompetitive effect.”). An increase in surplus is considered a pro-competitive outcome. See Roger D. Blair and Christina Depasquale, “Bilateral Monopoly: Economic Analysis and Antitrust Policy,” *The Oxford Handbook of International Antitrust Economics*, Volume 1 (Oxford University Press, 2014), pp. 364–379, at p. 372 (“But the agreement leads to an expansion of quantity transacted. Consequently, the buyer agreement appears to be procompetitive. Irrespective of what happens to the negotiated price (which would probably fall), social welfare increases as the sum of consumer and producer surplus increases.”).

⁷ Bernheim and Heeb (2014), p. 6 (“Consequently, it is appropriate to set a high bar for establishing that low prices are exclusionary (but not necessarily anticompetitive).”). See also Dennis W. Carlton et al., “Assessing the Anticompetitive Effects of Multiproduct Pricing,” *Antitrust Bulletin*, 53(3), pp. 587–622, at p. 622 (“Since bundling and quantity discounts are ubiquitous even in the absence of significant market power, we know that there are underlying procompetitive justifications for them. Accordingly, one should be wary of overzealous pursuit of antitrust liability for fear of chilling competition.”); Derek W. Moore & Joshua D. Wright, “Conditional Discounts and the Law of Exclusive Dealing,” *George Mason Law Review*, 22(5), pp. 1205–1246, at p. 1209 (“The authors do not believe that conditional discounts are often anticompetitive. Thus, a bright-line test such as that offered by *Brooke Group* or even per se legality might have some benefits from an error-cost perspective.”).

⁸ Murphy et al. (2014), p. 98 (emphasis added) (“As a business practice subject to antitrust scrutiny, therefore, QCDs [quantity commitment discounts] always have a procompetitive justification even if, in some circumstances, they might also have an exclusionary impact[.]”), p. 110 (“virtually all QCD practices have a procompetitive benefit.”).

⁹ Raphael De Coninck, “The As-Efficient Competitor Test: Some Practical Considerations Following the ECJ Intel Judgment,” *Competition Law & Policy Debate*, 4(2), 2018, p. 75 (“Competition for exclusivity enhances rivalry, and hence having safe-harbours that firms can implement ensures that such competition takes place when exclusivity is usually not anticompetitive.”).

17. Economists understand that volume-based pricing can be used in an anti-competitive way under specific limited circumstances, which the SEC has not shown applies to the market for trading venues.¹⁰ Specifically, volume-based pricing can be anti-competitive only if it leads to a foreclosure of competition that would result in consumer harm, that is, consumers would be harmed if a firm that can provide the good at low additional unit costs (*i.e.*, a firm that is “efficient”) is forced to exit the market if a rival firm introduces volume-based pricing. Therefore, a crucial step in determining whether volume-based pricing is anti-competitive is to evaluate whether it forecloses efficient competitors.¹¹ Further, economists agree that the exit of less efficient rival firms due to volume-based pricing is not anti-competitive.¹² Thus, for volume discounts to be anti-competitive, it must foreclose *efficient* rivals from the market.

18. Even if efficient firms are forced to leave the market, volume-based pricing will not be anti-competitive if new firms can enter to compete in response to a price increase by the incumbent firm. Thus, an additional condition that needs to be met for volume-based pricing to be anti-competitive is the lack of entry by new firms. In contrast, if there is evidence of entry, incumbent firms will not be incentivized to increase prices after the less efficient firms have left, given that entry would be possible at the higher prices.¹³ As explained in Section II.B., the Proposing Release appears to ignore the fact that multiple competing trading venues with different fee structures have entered the market in recent years.

19. The academic literature has developed established methods to evaluate if volume-based discounts are anti-competitive. For example, “equally efficient competitor” tests have been used to determine whether practices such as volume-based pricing are anti-competitive and warrant

¹⁰ In his comment letter on this Proposed Rule, Prof. Varret of George Mason University broadly asserts that volume-based pricing as a form of price discrimination “is a pernicious practice, deserving of particular competition scrutiny.” See Letter from Prof. Varret dated January 12, 2024 (“Varret Letter”), p. 7. However, as explained in this section, Prof. Varret’s broad claims are not consistent with the economic literature. Prof. Varret recognizes that price discrimination can have an anticompetitive effect specifically when “smaller players are squeezed out by discriminatory pricing practices.” However, Prof. Varret presents no evidence that smaller players are in fact being “squeezed out.” As documented below, the opposite appears to be true—new entrants are able to enter and survive in the current regime, leading to a proliferation of competing trading venues.

¹¹ Murphy et al. (2014), p. 90 (“Further, absent clear standards defining the bounds of illegal conduct the mere threat of antitrust liability may dampen rivalry among firms, with resulting harm to the competitive process and, ultimately, consumers.”).

¹² Murphy et al. (2014).

¹³ Bernheim and Heeb (2014), p. 30 (“If, for example, a rival harmed by exclusionary conduct is simply replaced by yet another equally capable competitor, then competition is not diminished. The existence of significant entry barriers is, therefore, generally a necessary but not sufficient condition for enhanced market power.”).

antitrust scrutiny.¹⁴ The efficient competitor test asks whether the resulting net price is below the level that would make entry possible for a competitor with equivalent costs to the incumbent *and* corresponding volume sales. If that is not the case, then there is no evidence to suggest the existence of anti-competitive exclusionary conduct.

20. As described above, the academic literature finds that volume-based pricing is generally pro-competitive. To my knowledge, the SEC has done no analyses to evaluate if volume-based prices have had an anti-competitive effect in this context. The SEC has not analyzed whether volume-based pricing has forced out an efficient competitor or raised barriers to entry in the market for trading venues.

B. Within the context of the market for trading venues, volume-based pricing is likely to be pro-competitive.

21. Based on the academic literature described above, volume-based pricing is pro-competitive in most circumstances but could be used in an anti-competitive way—if it is used to drive otherwise efficient competitors out of the market or preclude new efficient competitors from entering the market, enabling the incumbents to maintain prices at higher-than-competitive levels. This is less likely to occur in markets that are already highly competitive, such as markets that have multiple larger competitors of similar sizes, a large total number of competitors, low concentration, and low barriers to entry. It is also less likely to be anti-competitive in a setting where competitors do not only compete on price, but also offer other features to differentiate themselves.¹⁵ In that case, venues do not need to match volume discounts to attract volume because they also compete on other dimensions.

22. The existing market for equities trading venues is characterized by a large number of competing venues with various different structures, and low concentration. There are currently

¹⁴ Richard A. Posner, *Antitrust Law* (The University of Chicago Press, 2001), pp. 194–195 (“[I]n every case in which such a practice is alleged, the plaintiff must prove first that the defendant has monopoly power and second that the challenged practice is likely in the circumstances to exclude from the defendant’s market an equally or more efficient competitor.”).

¹⁵ This is an example of product differentiation. In an industry with differentiated products, each firm faces a residual demand curve and does not need to match the price of the other firms. Therefore, any risk of foreclosure of efficient competitors is lower if firms can capture enough demand with their differentiating features even if another one offers competitive volume discounts. See, e.g., Lawrence J. White, “Monopoly and Dominant Firms: Antitrust Economics and Policy Approaches,” in *The Oxford Handbook of International Antitrust Economics*, Volume 1 (Oxford University Press, 2014), pp. 313–344, at p. 326 (“With nonhomogeneity, the product and the seller are distinctive: In deciding from which seller to buy which product, buyers care about more than just which seller has the lowest price. They care about the attributes of the product and of the seller.”).

16 registered stock exchanges, roughly 30 ATSS, and more than 230 broker-dealers acting as off-exchange market centers.¹⁶ In addition, no one venue has a significant share: for Q3 2023, the largest single venue (Nasdaq) had a market share of just 15.5%, and the largest exchange group (ICE) only reached a market share of 19.4%, when considering the whole market for trading venues.

23. Traditional concentration metrics such as the Herfindahl-Hirschman Index (“HHI”) confirm that this market has low concentration. Based on data from Q3 2023, I estimate the HHI to be 677, where the market is defined to include exchanges, ATSS, and non-ATS off-exchange trading venues.¹⁷ Excluding the non-ATS off-exchange venues, I estimate the HHI to be 1,121.¹⁸ For reference, the 2023 Merger Guidelines from the Department of Justice and the Federal Trade Commission consider that only mergers in markets with an HHI greater than 1,800 warrant antitrust scrutiny.¹⁹ A low level of concentration is at odds with firms foreclosing as-efficient rivals and gaining market power as a result of volume-based pricing—a requirement for volume-based pricing to have an anti-competitive effect on the market for trading venues.

24. The Proposing Release suggests that in theory, it might be difficult for newer or smaller exchanges to offer liquidity rebates that could match those offered by the largest incumbent exchanges.²⁰ This argument has been repeated by at least one commenter.²¹ However, historical evidence does not support a view that smaller or newer exchanges cannot offer high liquidity rebates, or that volume-based pricing has limited competition. The Proposing Release cites to the Members Exchange (“MEMX”) as a supporting example, pointing to the fact that MEMX set its

¹⁶ FINRA, “ATS Transparency Data Quarterly Statistics: 2023 Quarterly Tables, 3rd Quarter, All NMS Stocks”; FINRA, “OTC Transparency Data: OTC (Non-ATS) Data.” (“FINRA 2023Q3 ATS Statistics”).

¹⁷ The HHI is calculated as the sum of squared market shares across market participants, where market shares are based on total trading volume measured by total shares.

¹⁸ Since brokers can route to ATSS and non-ATS trading venues as substitutes to routing to exchanges, I include them in my estimate of market concentration.

¹⁹ See 2023 Merger Guidelines, Section 2.1. Furthermore, the 2010 Merger Guidelines, which were in place until December 2023, defined a market with an HHI lower than 1,500 to be “unconcentrated.” See 2010 Merger Guidelines, Section 5.3.

²⁰ Proposing Release pp. 77, 78.

²¹ In its comment letter on this Proposed Rule, IEX cites to the Proposing Release, claiming that “any new or smaller exchange that sought to compete by matching the top tier payouts would not have the incoming order flow to support those payments and so would be forced to operate at a loss.” See Letter from IEX dated January 5, 2024. IEX also claims that volume-based pricing drives exchanges to compete on “transaction pricing rather than on measures that matter more to market quality and investor welfare.” This claim is also inconsistent with the economics of trading venues. IEX presents a false dichotomy of competition on transaction pricing versus competition on other measures. In fact, trading venues compete for order flow along multiple dimensions, and transaction pricing is one of them. IEX provides no economic rationale for why limiting competition on transaction pricing would be pro-competitive.

liquidity rebate higher than its take fee (unprofitable pricing) in order to attract market share. However, MEMX's experience demonstrates that volume-based pricing has not prevented successful entry. After launching in September 2020, MEMX had achieved a market share of 5.48% of exchange volume by January 2023 (and about 3% market share across all venues in Q3 2023),²² and now has adopted a pricing schedule similar to the larger, incumbent exchanges. This is just one example. Volume-based pricing has been in place for decades, over which time competition has thrived, numerous new venues have entered, and outcomes have improved for investors.

25. As described above, volume-based discounts are anti-competitive only if they cause the exit of efficient firms, and there are high barriers to entry such that new firms cannot enter the market in response to a price increase. I note that at least one commenter has asserted that volume-based pricing creates barriers to entry to new trading platforms, but the evidence contradicts his view.²³ The sheer number of competitors in this market casts doubt on any conclusion that there are significant barriers to entry for efficient competitors. Historical evidence in the securities exchange market demonstrates a pattern of successful entries by new trading platforms, which have managed to secure enough market share to survive and maintain their presence over extended periods. MEMX, discussed above, is just one example.²⁴ MIAX Pearl, another entrant in 2020, had a market share of 1.86% of exchange volume in January 2023 (and about 1.75% market share across all venues in Q3 2023).²⁵ Going back further in time, IEX (Investors Exchange) launched in 2013, became a national securities exchange in 2016, and had a 4.46% market share of exchange volume in January 2023 (and about 2% market share across all venues in Q3 2023).²⁶

26. In the late 2000s, there were notable entries by ATSS like BATS and Direct Edge, which later registered as exchanges. BATS Global Markets converted its electronic crossing network to a national securities exchange in 2008 and later launched a second exchange.²⁷ Direct Edge, also

²² Proposing Release, Table 4.

²³ Prof. Varret asserts that volume-based pricing "creates a significant barrier to entry for smaller and mid-sized brokers and new platforms, including those licensed exchanges seeking to innovate with advanced technologies and better execution performance for investors." See Varret Letter, p. 22. Prof. Varret provides no basis for the assertion, which is inconsistent with the evidence presented below.

²⁴ Proposing Release, Table 4. FINRA 2023Q3 ATS Statistics.

²⁵ Proposing Release, Table 4. FINRA 2023Q3 ATS Statistics.

²⁶ Proposing Release, Table 4. FINRA 2023Q3 ATS Statistics.

²⁷ BATS Global Markets, SEC Form S-1, filed on, May 13, 2011, p. 2.

initially an ATS, received SEC approval in 2010 to operate as two separate exchanges, EDGA Exchange Inc. and EDGX Exchange Inc.²⁸ Today, the four former BATS and Direct Edge exchanges are owned by Cboe, and these four exchanges collectively had a market share of around 24% of exchange volume in January 2023 (and about 13% market share across all venues in Q3 2023).²⁹ Island and Archipelago followed a similar path in the 1990s.³⁰ These examples highlight the dynamic nature of the market for trading venues, which is characterized by a large number of competitors, low concentration, and where new entrants have successfully challenged incumbents and diversified the landscape. New entrants have entered the market with different fee structures—many have used volume-based pricing as a tool to attract liquidity providers and build market share, while others have offered alternative fee structures.

27. The SEC’s Division of Trading and Markets recognized in 2015 that competition across trading venues was “vigorous” and that fee structures targeting certain types of market participants were a result of this competition.³¹ Similarly, the SEC’s Chief Administrative Law Judge (Brenda Murray) evaluated competition across exchanges in 2016 and determined that “there is fierce competition for trading services (or ‘order flow’).”³² These assessments were made when there were 11 operating equities exchanges. There are now 16. The high level of competition between trading venues has spurred innovation, including the development of maker-taker pricing and volume-based discounts, and has resulted in a significant, extended decline in transaction costs for investors.³³

²⁸ “Direct Edge Exchange Registration-OATS Impacts,” FINRA. “Direct Edge Gets SEC Approval for Stock Exchange Status,” Finextra, March 15, 2010.

²⁹ Proposing Release, Table 4.

³⁰ Proposing Release, Table 4.

³¹ “With 11 operating equities exchanges and dozens of ATSs, there is vigorous price competition among the U.S. equity markets and, as a result, fees are tailored and frequently modified to attract particular types of order flow, some of which is highly fluid and price sensitive.” See *Maker-Taker Fees on Equities Exchanges*, SEC Division of Trading and Markets, October 2015. See

³² Securities and Exchange Commission, “Initial Decision Release No. 1015,” Administrative Proceeding File No. 3-15350, June 1, 2016, p. 8.

³³ In the market for exchange services, “maker” refers to liquidity providers who add liquidity to a platform by posting non-marketable limit orders into a venue, and “taker” refers to liquidity takers who remove liquidity from a platform by entering marketable orders that transact against existing non-marketable limit orders on a venue. In his comment letter on this Proposed Rule, Prof. Varret misguidedly claims that take fees set at “extraordinary high rates of 30 mils” represent the exercise of oligopoly power on behalf of the exchanges because “ATS platforms have been able to provide access to their platforms at 10 mils.” See Varret Letter, p. 3. However, Prof. Varret appears to misunderstand the economics of exchanges and neglects to consider the cost incurred to have that liquidity available on the exchange in the first place, namely, the rebates offered to liquidity providers. Take fees do not represent net revenues to exchanges, as take fees are used to pay the liquidity provider. The appropriate measure of exchange pricing would be the difference between take fees and liquidity rebates. When an exchange charges a take fee of 30 mils and rebates 30 mils or more as a rebate to the liquidity provider, the exchange is incurring a cost on that transaction.

28. Since the advent and expansion of electronic trading in the early twenty-first century, measures of market quality have improved considerably, driven by technologic improvements as well as changes in market structure.³⁴ Some studies have found that execution speeds have fallen,³⁵ and large block transactions have become less costly, thanks to algorithms that slice large trades into multiple smaller ones.³⁶ Bid-ask spreads on Russell 3000 stocks have decreased from around 60 basis points in 1995 to an average of 5 basis points in 2021.³⁷ Some of these improvements can be attributed to changes in market structure, such as decimalization and reduction in tick size.³⁸ However, researchers have also attributed part of the improvements to an overall increase in competition between trading venues as incumbent exchanges have introduced more aggressive pricing structures, particularly the maker-taker model, to attract volume from alternative trading venues.³⁹ Thus, given the level of competition in the market in general, and the lack of analysis in the Proposing Release, there does not appear to be any evidence that volume-based pricing is being used anti-competitively.

C. Volume-based pricing compensates larger members for positive liquidity externalities.

29. Volume-based pricing has additional pro-competitive effects that are specific to trading venues. Trading costs can be substantially higher when liquidity is lower.⁴⁰ Members that concentrate their trading activity on an exchange create “liquidity externalities” due to network

³⁴ Oliver Linton and Soheil Mahmoodzadeh, “Implications of High-Frequency Trading for Security Markets,” *Annual Review of Economics*, 10, 2018, pp. 237–259 (“Linton and Mahmoodzadeh (2018)”).

³⁵ James J. Angel, Lawrence E. Harris, and Chester S. Spatt, “Equity Trading in the 21st Century: An Update,” *Quarterly Journal of Finance*, 5(1), 2015, pp. 1–39 (“Angel et al. (2015)”).

³⁶ According to estimates by Angel et al. (2015), the average cost of block trades decreased by a factor of three between 1999 and 2012. See Angel et al. (2015), Figure 2.

³⁷ Phil Mackintosh, “Have Spreads Changed Over Time?,” *Nasdaq News and Insights*, October 14, 2021.

³⁸ “The decimalization process in the US markets, which saw the tick size reduced from 12.5 cents to 1 cent for large stocks around 2000, is a significant factor in the decline of bid-ask spreads.” Linton and Mahmoodzadeh (2018), p. 246.

³⁹ Katya Malinova and Andreas Park, “Subsidizing Liquidity: The Impact of Make/Take Fees on Market Quality,” *The Journal of Finance*, 70(2), 2015, pp. 509–536. Note that while competing for the same liquidity and order flow as exchanges, ATSs operate under a different regulatory regime than exchanges, which allows them to compete on different dimensions. It appears that ATSs would also be allowed to offer volume-based pricing for agency flow under the Proposing Release.

⁴⁰ Michael J. Barclay and Terrence Hendershott, “Liquidity Externalities and Adverse Selection: Evidence from Trading after Hours,” *The Journal of Finance*, 59(2), 2004, pp. 681–710 (“Barclay and Hendershott (2004)”), pp. 682–683 (“We find that the adverse-selection component of the spread is more than four times larger during the preopen than during the trading day, and more than twice as large during the postclose as during the trading day.... These patterns suggest that the liquidity externalities primarily reflect reduced adverse-select.”).

effects; additional members in the exchange reduce trading costs for other members.⁴¹

Economists use the term “externality” to describe costs or benefits from an economic decision (such as which platform a broker-dealer chooses to route their orders) that accrue to third parties external to, and not considered by, the one making the decision (such as other members of the platform).⁴² “Liquidity externalities” refer to the positive impact on other platform members of liquidity being added to that platform. The SEC recognizes and discusses these effects in the Proposing Release.⁴³ Volume-based pricing allows trading venues to compensate large members for the positive liquidity externalities they create.⁴⁴ As described later, these members that qualify for the highest rebates provide a significant liquidity on Nasdaq, and thus likely generate important liquidity externalities that benefit the smaller members.

30. Liquidity externalities play an important role in reducing trading costs and, therefore, the efficiency and competitiveness of a trading venue. They arise when enough members are participating in an exchange, and the critical mass of liquidity thereby reduces search and trading costs.⁴⁵ The reduction in trading costs associated with liquidity externalities can be substantial. To see this, one can compare trading costs at times when liquidity is relatively ample against times when liquidity is relatively scarce. As an example, spreads can be three to four times higher during after-hours trading than during the trading day, which can be attributed to the effect of reduced liquidity externalities.⁴⁶

31. Larger members generate more liquidity externalities, as well as other efficiencies that help exchanges achieve economies of scale. First, large brokers are able to bring more liquidity

⁴¹ Barclay and Hendershott (2004), p. 681 (“Bringing traders together creates liquidity externalities because the additional traders arriving in the marketplace reduce trading costs for all investors.”).

⁴² The quintessential example of a positive externality is the increased productivity of farms that happen to be located near beekeepers. The beekeeper decides to keep bees for honey, without considering the impact of those bees on the nearby farmers, who nevertheless benefit from the beekeeper’s decision.

⁴³ “However, in the context of trading platforms with liquidity externality, additional order flow from high-volume exchange members may ultimately be beneficial to lower-volume broker-dealers. High-volume exchange members likely contribute substantially more to the depth of book on an exchange. When volume-based discounts induce additional order flow from high-volume broker-dealers to convene on a dominant exchange, more liquidity reduces the cost of searching for the best execution and benefits the lower-volume broker-dealers.” Proposing Release, p. 144.

⁴⁴ Liquidity externalities can be thought of as an indirect network effect generated by liquidity providers. An efficient price charged to liquidity providers should take the externality into account. See Marc Rysman, “The Economics of Two-Sided Markets,” *Journal of Economic Perspectives*, 23(3), 2009, pp. 125–143, at p. 129 (“The main result is that pricing to one side of the market depends not only on the demand and costs that those consumers bring but also on how their participation affects participation on the other side and the profit that is extracted from that participation.”).

⁴⁵ Barclay and Hendershott (2004), p. 683 (“However, the lower trading activity degrades the liquidity externalities and results in substantially higher trading costs.”).

⁴⁶ Barclay and Hendershott (2004).

into an exchange, enhancing the effect of liquidity externalities. Second, in an industry with economies of scale due to high fixed costs, large members help the exchange achieve an efficient scale by providing the necessary volume, which lowers transaction costs for all members. Given the liquidity externalities generated by large members, it may be economically rational for exchanges to incur a cost to attract these large members to the platform by offering them liquidity rebates that exceed the fees generated from liquidity taking orders. If prohibiting volume-based pricing removes incentives for large members to route their orders to a given exchange, the exchange may not be able to operate at the same efficient scale, which could result in increased transaction costs for all members.

D. SEC concerns about anti-competitive tying of the auction and the continuous market are unfounded in this setting.

32. Because discounts on the closing auction pricing are based on a member's overall trading volume on the exchange, members are incentivized to make their continuous market trades on the same exchange. The SEC suggests that this form of "tying" can reduce competition or have other exclusionary effects and cites a number of sources for the general proposition that tying and bundling can be harmful to competition.⁴⁷

33. This assessment by the SEC, however, is incorrect and incomplete for multiple reasons. First, tying and bundling are considered pro-competitive in most circumstances. Second, the incentives created by volume-based pricing do not constitute a tie in the traditional sense, but instead could be considered a form of "mixed bundling" or a weaker form of tying, which bring even fewer anti-competitive concerns. Third, the circumstances under which tying or bundling can be harmful to competition are well understood, and there is no indication that they apply in this case. Finally, the SEC has not done any analysis to evaluate whether the exchanges' bundled discounts have caused foreclosure of trading venues or raised barriers to entry; on the contrary, the evidence discussed in Section II.B. confirms that the market has low levels of concentration and multiple successful entrants.

⁴⁷ Proposing Release, p. 80

34. First, the academic literature has found that the “vast majority” of bundling and tying arrangements are pro-competitive and welfare-enhancing.⁴⁸ On the consumer side (in this case, the executing brokers who receive volume discounts from exchanges), bundling may improve the quality and convenience of the products, as consumers are able to purchase both of them together with a discount on at least one of the goods.⁴⁹ On the producer side (here, the exchanges that offer bundling across auction and continuous market orders), bundling and tying may increase the efficiency of the producing firm by lowering marginal costs,⁵⁰ lowering fixed costs, or allowing the firm to reach economies of scale when demand for a product with high fixed costs is increased through the bundling.⁵¹ Firms benefit from these efficiencies in both competitive markets and when they possess market power.⁵² Therefore, even bundling by a monopolist or firm with high market power (scenarios which are inapplicable here for reasons discussed above) cannot be interpreted as anti-competitive monopoly leveraging without further review. Given that both consumers and firms can benefit from bundling, the academic literature recommends that challenges to bundling on the grounds of anti-competitive harm impose “substantial proof requirements on challengers.”⁵³

35. Second, in practical terms, the incentives created by volume-based pricing do not constitute a tie or bundling in the traditional sense; therefore, any anti-competitive concerns are less likely to apply in this setting. Tying occurs when a firm conditions the purchase of one product (the tying good) to the purchase of another product (the tied product).⁵⁴ Bundling occurs when a firm sells two products together. Under “pure” bundling, the firm only sells the products

⁴⁸ Erik Hovenkamp and Herbert Hovenkamp, “Tying Arrangements,” in *The Oxford Handbook of International Antitrust Economics*, Volume 2 (Oxford University Press, 2014), pp. 329–350 (“Hovenkamp and Hovenkamp (2014)”), p. 348 (“In the vast majority of cases tying arrangements increase welfare, whether measured under a general welfare or a consumer welfare test.”).

⁴⁹ David S. Evans and Michael Salinger, “Why Do Firms Bundle and Tie? Evidence from Competitive Markets and Implications for Tying Law,” *Yale Journal on Regulation*, 22(1), 2005, pp. 37–89 (“Evans and Salinger (2005)”), p. 41 (“Bundling—offering two or more products at a single price—can provide efficiencies such as marginal cost savings, quality improvements, and customer convenience.”).

⁵⁰ Evans and Salinger (2005), p. 41 (“Bundling—offering two or more products at a single price—can provide efficiencies such as marginal cost savings, quality improvements, and customer convenience.”).

⁵¹ Evans and Salinger (2005), p. 42 (“[F]irms in competitive markets may find it efficient to tie when they can economize on the fixed cost of product offerings or when they can realize product-specific scale economies.”).

⁵² Evans and Salinger (2005), p. 42 (“And of course if firms in competitive markets can tie for efficiency reasons, so can firms with significant market power.”).

⁵³ Hovenkamp and Hovenkamp (2014), p. 348 (“As a result, the so-called per se rule for tying is wrongheaded, and ties should be addressed under the rule of reason, with fairly substantial proof requirements on challengers.”).

⁵⁴ Jean Tirole, “The Analysis of Tying Cases: A Primer,” *Competition Policy International*, 1(1), 2005, pp. 1–25 (“Tirole (2005)”), p. 8 (“Tying refers to the behavior of selling one product (the tying product), conditional on the purchase of another product (the tied product).”).

as a bundle. The practice of also offering the products on a stand-alone basis is called “mixed” bundling.⁵⁵ Exchanges do not impose tying or pure bundling because they do not condition participation on their auction market with participation on the continuous market, and brokers are free to trade on each market separately. Instead, volume-based pricing at most represents a form of mixed bundling, or what some economists refer to as “bundled loyalty discounts,”⁵⁶ which are less likely to be harmful to competition.⁵⁷

36. Third, the circumstances where bundling, tying, mixed bundling, or bundled loyalty discounts can be harmful to competition are well-understood. For example, a firm with market power in the primary market may discount the price of the secondary good to a level that makes it infeasible for a competitor in the secondary market to continue operating. Alternatively, if a firm holds a monopoly in one of the markets and both goods must be purchased together (they are complementary goods), the monopolist could impose a tie on the secondary market to deter entry in the monopoly market.⁵⁸ Such would not be the case in this market, because trading in the continuous market and trading in the auction market are not complements. In fact, from the perspective of investors, trading in the closing auction is a substitute for trading in the continuous market. Also, there are limits to the market power the primary exchanges have in the closing auction, because they face competition from off-exchange venues and other exchanges to execute at the closing price.

37. Moreover, tying arrangements are anti-competitive only when they involve predatory pricing that causes firms to exit the market and in industries characterized by high

⁵⁵ Tirole (2005), p. 8 (“Bundling refers to the practice of selling two products together. Pure bundling means that the products are available only as a bundle. The difference between tying and pure bundling is that the tied product is available on a stand-alone basis under tying, but not under pure bundling.... Under mixed bundling, the products are available both on a stand-alone basis and as a bundle; furthermore, the price of the bundle is smaller than the sum of the two individual price.”).

⁵⁶ Patrick Greenlee et al., “An Antitrust Analysis of Bundled Loyalty Discounts,” *International Journal of Industrial Organization*, 26(5), pp. 1132–1152.

⁵⁷ Barry Nalebuff, “Bundling as an Entry Barrier,” *Quarterly Journal of Economics*, 119(1), 2004, pp. 159–187, at p. 174 (“An uncontested monopolist, selling a mixed bundle, A, B, and an A–B bundle, could always achieve higher profits. However, mixed bundling is less effective in the presence of a rival than in the pure monopoly model. The reason is that the incumbent has to be concerned that a rival with one product, say B, will use the incumbent’s other product, A, to create a rival bundle and thereby steal all of the incumbent’s bundle sales. Thus, the individual items need to be priced very high relative to the bundle, and so the individual items in the mixed bundle generate relatively few additional sales. Given the limited potential for this approach to increase profits, we do not pursue it further.”).

⁵⁸ Christian Ahlborn, David S. Evans, and A. Jorge Padilla, “The Antitrust Economics of Tying: A Farewell to Per Se Illegality,” *The Antitrust Bulletin*, 49(1/2), 2004, pp. 287–341, at p. 326 (“Their theory is built on the assumption that potential competitors may refrain from entering the monopoly market if they face the incumbent as its sole complementary good producer. The monopolist, therefore, has an incentive to monopolize the tied good in order to protect its rents.”).

concentration.⁵⁹ Such situations rely on assumptions that do not apply in this case. As discussed in Section II.B., the market for trading venues is characterized by low levels of concentration, and entry from new competitors.

38. Furthermore, the standard economic understanding about the potential anti-competitive impact of bundling or tying arrangements, if any, would apply to the market where the volume discounts are being offered (*i.e.*, trading venues), and not on the downstream market (*i.e.*, brokers and investors).⁶⁰ In other words, economists generally worry that bundling or tying could affect competition among the firms offering the bundling or tying, not their customers who benefit from the discounts. Thus, there is a lack of theoretical support for the SEC's concerns that bundling of exchange services could harm competition across brokers.

39. The SEC has not provided any analysis or research on the effect of the bundled discounts on the relevant market, that is, trading venues. The Proposing Release does not claim that the listing exchanges have a monopoly on their closing auctions. It merely theorizes that “[b]ecause of the high value placed on executing in the closing auction described above, listing exchanges are able to offer a relatively unique trading mechanism.”⁶¹ However, given that there is substitutability between the closing auction and trading in the continuous market or other venues, one cannot conclude that listing exchanges have substantial market power over their auctions without conducting an economic analysis. Moreover, the SEC has not provided any evidence that volume discounts have foreclosed trading venues or prevented entry. On the contrary, as explained in Section II.B., the history of equity trading in the US is consistent with rigorous competition across trading venues, in which multiple small competitors have remained in operation, and the market has seen the successful entry of new venues.

⁵⁹ Michael D. Whinston, “Tying, Foreclosure, and Exclusion,” *American Economic Review*, 80(4), 1990, pp. 837–859, at p. 839 (“Most interestingly, the mechanism through which this exclusion occurs is foreclosure; by tying, the monopolist reduces the sales of its tied good market competitor, thereby lowering his profits below the level that would justify continued operation.”); Hovenkamp and Hovenkamp (2014), p. 338 (“These barriers to entry or mobility can emanate from a variety of sources, including intellectual property rights or other government-created licensing restrictions, differential economies of scale in the markets for the tying and tied products, or reasons related to asset specificity and risk that are commonly associated with barriers to entry.”).

⁶⁰ Murphy et al. (2014), p. 102 (“Contracts that prevent or restrict a rival’s ability to sell to some buyers for a period of time, but do not impair the rival’s ability to compete—that is, do not drive the rival from the market or raise its marginal costs—do not impinge the rival’s ability to discipline market prices.”).

⁶¹ Proposing Release, p.81.

III. Volume-based pricing is not harmful to competition across brokers.

40. The SEC raised concerns that volume-based exchange pricing might have an adverse impact on competition across brokers:

The Commission is concerned about the impact of volume-based exchange transaction pricing, as tiered pricing has expanded and evolved, on competition among exchange members, such as when broker dealers are competing for customers.⁶²

41. Specifically, the concern appears to be that smaller broker-dealers who do not qualify for the volume-based pricing face higher trading costs, and this makes it harder for them to compete against larger brokers.⁶³ This concern appears to be unfounded. In particular:

- a. A flattening of the fee schedule is likely to increase, not decrease, trading costs for smaller brokers. Smaller brokers nearly always execute trades through larger executing brokers and can benefit indirectly from their executing broker qualifying for volume-based pricing. (See Section III.A.)
 - b. Evidence suggests that competition across executing brokers has been and is currently strong, and that executing brokers pass the benefits of higher volume-based pricing on to routing brokers. The SEC can, but has chosen not to, conduct further economic analysis to assess the evidence on the extent to which smaller brokers can fully access the benefits of volume-based pricing. (See Section III.B.)
- A. Prohibiting volume-based pricing is likely to increase, not decrease, costs for smaller broker-dealers.**

42. The SEC's fear appears to be that because smaller brokers are unable to qualify for the best volume-based pricing, this will make it harder for them to compete with larger brokers for customers. For example, the Proposing Release states that if an exchange member qualifies for better volume-based pricing,

⁶² Proposing Release, p. 12.

⁶³ Proposing Release, p. 18.

the member may be able to attract additional order flow from customers because it can offer customers *the same lower fees and higher rebates* either directly through pass-through exchange transaction pricing or indirectly through lower commissions.⁶⁴

43. In suggesting that volume-based pricing makes it harder for smaller brokers to attract customers, the SEC seems to ignore that volume-based pricing can work to the benefit of smaller brokers, including those that choose not to be exchange members. When exchange members who qualify for better volume-based pricing “offer customers the same lower fees and higher rebates,” those “customers” include smaller brokers who are using the high-volume members as executing brokers.

44. The SEC is explicit in recognizing that large broker-dealers can pass on the benefits of volume-based pricing to smaller brokers:

Through direct market and sponsored access services, investor *and other lower-volume broker dealers* choose to route orders through high-volume broker dealers. Among the benefits from doing so, *the current exchange transaction price tiers allow the lower-volume broker-dealers to share in some or all of the volume-based tiers of high-volume broker-dealers* if they receive pass-through exchange transaction pricing, subject to the costs they pay to the sponsor for those services.⁶⁵

45. The SEC seems to be focused specifically on “direct market and sponsored access services,” through which exchange members allow market participants, such as proprietary trading firms, to trade directly on the exchange under the sponsor’s membership. With respect to direct market access, the SEC states that its understanding is that full pass-through of the benefits of volume-based pricing is “less common”⁶⁶ and that the extent to which pass-through occurs is “uncertain because these arrangements are not disclosed.”⁶⁷

46. If the question is whether the benefits of volume-based pricing are passed on to smaller broker-dealers who are competing for customers, this focus on direct market access seems misplaced. When smaller brokers need to execute trades on behalf of customers, they do not

⁶⁴ Proposing Release, p. 18 (emphasis added).

⁶⁵ Proposing Release, p. 103 (emphasis added).

⁶⁶ Proposing Release, fn. 27 and p. 31.

⁶⁷ Proposing Release, p.19.

typically need direct market access. Large broker-dealers compete with each other to provide execution services to smaller brokers, which means stepping in to handle the order flow as executing brokers. The smaller brokers' routing practices, including fees and rebates passed back from the executing broker to the routing broker, are disclosed on the routing brokers' disclosures under Rule 606.⁶⁸ Thus, it should not be difficult for the SEC to evaluate the extent to which smaller brokers can indirectly enjoy the benefits of volume-based pricing.⁶⁹

47. As discussed in the Proposing Release, prohibiting volume-based pricing may result in a flattening of the fee schedule at a level that increases trading costs (e.g., reduces liquidity rebates) for members that currently qualify for volume-based pricing.⁷⁰ The Proposing Release also recognizes that to the extent that executing brokers who qualify for volume-based pricing are passing on the benefits to the routing brokers, the Proposed Rule will also increase costs for the low-volume brokers who route through them. As discussed in the following section, the evidence suggests that the competition between these large firms is vigorous, so smaller brokers would be expected to reap the benefits of volume-based pricing by routing through larger firms.

48. Therefore, the Proposed Rule, if anything, is likely to increase—not decrease—costs for smaller brokers and make it more difficult for them to survive. The Proposing Release suggests that a change in transaction fees for small and medium-sized broker-dealers can affect the profitability of such firms, their propensity to enter or exit the market, and the degree of competition in the market for brokerage services.⁷¹ If this is true, but the Proposed Rule results in higher, not lower, transaction fees for smaller participants, this implies the Proposed Rule would place an additional burden on competition, not remove a burden.

⁶⁸ Securities and Exchange Commission, . "Disclosure of Order Handling Information," Release No. 34-84528, January 18, 2019.

⁶⁹ Even if the SEC were to find evidence that executing brokers are not fully passing through rebates to smaller brokers, and this gave rise to some concerns, it seems the most direct response that the SEC could consider would be to regulate broker pass-throughs directly, rather than banning volume-based pricing. The Proposing Release does not consider this reasonable alternative.

⁷⁰ "To the extent that average exchange per unit trading fees become more expensive than the lowest per unit (i.e., top tier) fees currently offered, the proposed banning of volume-based exchange transaction pricing for agency-related volume would result in costs for the high-volume exchange members and possibly the smaller non-members routing through them if they receive pass-through exchange transaction pricing. This increase in costs may in turn cause the commissions charged by such broker-dealers to increase, resulting in costs for their customers as well." Proposing Release, p. 117.

⁷¹ Proposing Release, p. 112.

B. Executing brokers are competitive and likely pass on the benefits of volume discounts.

1. The market for executing broker services has the characteristics of a highly competitive market.

49. As explained above, competition across trading venues appears robust, and has resulted in a fragmentation of liquidity across a large number of trading locations, including exchange and off-exchange venues. The executing broker’s task of finding the best available price has become complicated due to (1) the large number of trading venues, (2) the fact that much of the available liquidity is not publicly displayed, and (3) the fact that prices and the availability of liquidity tend to change very quickly. In this environment, execution quality can be significantly enhanced through the use of technology—specifically, through algorithms that break up larger orders into smaller orders and execute them gradually over time, and “smart order routing” technologies implemented in locations that have low-latency access to data feeds and trading centers.

50. As the Commission correctly observes, there are significant fixed costs associated with developing these technologies, and the resulting economies of scale mean that many smaller and medium-sized brokers find it more efficient to outsource order routing to a larger firm rather than attempting to develop the technologies in-house. As recognized in the Proposing Release, this happens for reasons unrelated to volume-based pricing on exchanges.⁷²

51. Despite the significant fixed costs, there are still quite a number of broker-dealers who have developed these capabilities. According to the Proposing Release, “the Commission understands that roughly 30 broker-dealers across exchanges, including the dozen or so largest exchange members, have functional smart order routers . . . , dedicated cabinets at data centers, and enough technical staff to support their functionalities.”⁷³ These broker-dealers compete with each other to offer services as executing brokers for institutional investors and to attract order flow from other large, medium, and small brokers who find it more efficient to outsource trade execution.

⁷² Proposing Release, pp. 104–105.

⁷³ Proposing Release, pp. 112–113.

52. As an initial matter, given that there are a variety of reasons apart from volume-based pricing for why smaller brokers choose to route through executing brokers, it is unclear how many, if any, new executing brokers would enter the market after implementing the Proposed Rule. The Proposing Release provides no analysis of how much entry the SEC expects.

53. Even assuming entry following the Proposed Rule, the central question is whether competition across the existing executing brokers is already sufficiently strong to induce them to pass all or most of the benefits of volume-based pricing to the routing brokers who route through them. If so, there is little reason to believe adding a few more executing brokers with smart routing capabilities should generate further competitive benefits for customers. Moreover, if smaller brokers and their customers are already enjoying the benefits of volume-based pricing by routing to an exchange member who qualifies for better prices, the Proposed Rule could harm these smaller brokers and their customers by imposing a flat fee structure.

54. In fact, there are reasons to believe that the structure of the market for providing services as an executing broker is competitive. For one, switching costs are likely to be low. High costs of a customer moving business to a different supplier can effectively make a market less competitive, as a customer might not find it optimal to incur the switching cost in response to an increase in price. Market participants in this market use standardized messaging protocols for sending orders, so a routing broker should be able to start routing to different venues without significant startup costs.

55. Another reason switching costs are likely to be low is that market participants, including buy-side firms like hedge funds and asset managers, as well as smaller brokers who route to executing brokers, often establish relationships with multiple executing brokers, and routinely route a portion of their order flow to each. By design, this arrangement lowers the cost of re-allocating order flow between executing brokers to essentially zero. This practice makes it easy for the broker to monitor performance and condition future order routing on performance, thus forcing executing brokers to compete with each other on execution quality.⁷⁴ Routing brokers

⁷⁴ For example, see Jonathan Brogaard, “Economic Analysis of the SEC’s Proposed Best Execution and Order Competition Rules,” July 12, 2023, p. 39 (. “To comply with their best execution obligations, brokers like Schwab rigorously monitor wholesalers to ensure that wholesalers are delivering high-quality execution outcomes for investors. Where wholesalers fall short, brokers can simply reallocate future retail order flow to a competing wholesaler. In short, far from being an anti-competitive space, brokers can push wholesalers to compete with one another to improve how well they meet the execution needs of retail investors.”).

have a natural business incentive to monitor execution quality and rebates paid by executing brokers, as well as a duty of best execution, embodied in FINRA Rule 5310, which requires them to perform rigorous and regular review to evaluate execution quality.

56. Because execution quality is so important, well-established metrics for measuring execution quality have been developed, so any differences in quality are readily detectable and actionable by market participants. To the extent some brokers offer higher-quality execution than others (but might charge a higher price), routing brokers should be able to measure execution quality and account for it in their routing decisions.

57. For these reasons, it is likely that competition across executing brokers is strong. This, together with the fact that there are 30 firms with the infrastructure to compete in the market for NMS equities, provides evidence that the market is already competitive. This implies that executing brokers likely pass most or all of the benefits of volume-based pricing to the smaller brokers who are their customers. This benefit could be passed on in the form of a direct pass-through, or in other ways. The SEC could evaluate the level of pass-through as part of an analysis of competition between executing brokers.⁷⁵ However, the Proposing Release has not done so.

2. Quantitative analysis of market shares within Nasdaq suggests that the market for executing brokers is likely to be competitive.

58. Even though its stated goal is to address competition between exchange members, the Proposed Rule does not contain any analysis of competition in this market. The SEC has access to data that would allow it to conduct a market-wide analyses. While I do not have such data, this section presents some analysis based on data from Nasdaq that suggests the market for executing brokers is likely competitive.

⁷⁵ The benefits of volume-based pricing would be reflected in a lower marginal cost for the executing broker. The difference in the price charged to the routing broker and the marginal cost depends on the level of competition faced by the executing broker. In a competitive environment, the executing broker would price close to marginal cost, resulting in the benefits of volume discounts being passed through to the routing broker. See Jeffery R. Church and Roger Ware, *Industrial Organization: A Strategic Approach* (McGraw-Hill/Irwin, 2000), p. 29 (“A firm has market power if it finds it profitable to raise price above marginal cost.”), p. 36 (“[T]he market power of a firm depends on the elasticity of demand,” that is, “[t]he more elastic demand, the larger [elasticity] and the smaller the price distortion [between price and marginal cost].”).

59. To properly assess the concentration of executing brokers, one would need to examine their market shares across all executing venues, including exchanges, ATSS, and off-exchange market makers. Those data are available to the SEC. However, I only have visibility on Nasdaq exchanges. While the Nasdaq Stock Market is the largest exchange by market share, conclusions based on an HHI analysis of executing brokers on just a single venue are necessarily limited. Nevertheless, given the structure of the executing broker market where the largest players have access to every platform, it is likely that the HHI results I derive from trading on Nasdaq could be informative of the whole market. As the Proposing Release explains:

Based on staff experience, the Commission understands that roughly 30 broker-dealers across exchanges, including the dozen or so largest exchange members, have functional smart order routers (“SORs”), dedicated cabinets at data centers, and enough technical staff to support their functionalities. Consistent with that understanding, the average exchange has 34 members who contribute up to 99% of its dollar volume, where the average is taken over the 16 exchanges for the month of January 2023.⁷⁶

Furthermore, to the extent that an HHI measure calculated from one venue might be biased, it would likely be biased upwards. As shown in the Proposing Release, individual broker concentration is higher than a pro-rata allocation across venues by market share.⁷⁷

60. Taking the SEC’s characterization of this market as given, I calculated the HHI for the largest 30 members on Nasdaq as the market for executing brokers based on total shares. This yielded an HHI of about 722 for Q3 2023, which has been characterized as an “unconcentrated” market.⁷⁸ Limiting to just agency-related volume from these executing brokers yielded an HHI of 1,107, which is still unconcentrated. I also note that some of the 30 largest members are relatively new entrants.

⁷⁶ Proposing Release, pp. 113, 114.

⁷⁷ “Individual members appear to be more concentrated (0.20) than would be expected by the relative market shares of the exchanges (0.18).” Proposing Release, p. 95.

⁷⁸ The 2010 Merger Guidelines, which were in place until December 2023, defined a market with an HHI lower than 1,500 to be “unconcentrated.” See 2010 Merger Guidelines, Section 5.3.

IV. The Proposed Rule is likely to have adverse effects on liquidity, trading costs, efficiency, and capital formation.

61. The SEC’s own analysis, as well as new analysis presented here, suggests significant risk that the Proposed Rule would result in adverse effects on execution quality, price discovery, efficiency, and capital formation, counter to the goals of the Exchange Act.

62. Given that the primary purpose of volume-based pricing is to attract liquidity to an exchange’s platform, a likely first order impact of the Proposed Rule’s ban on volume-based pricing is that liquidity could migrate away from exchanges to off-exchange venues. The potential for such migration is acknowledged by the SEC, and the Proposing Release foresees various adverse effects, including the reduction of displayed liquidity, widening of bid-ask spreads, and increased trading costs, both on and off-exchange. The SEC even acknowledges that these effects could be harmful to efficiency.⁷⁹ However, the SEC has not attempted to quantify the potential magnitude of these adverse effects. The analysis presented here suggests that the adverse effects identified by the SEC are likely to be economically significant.

A. The SEC’s own economic analysis identifies these potential adverse effects.

63. As discussed above, the SEC acknowledges that one of the primary modes of competition between exchanges is the competition to attract liquidity providers to their respective platforms. A platform that can attract more sellers of transaction services (liquidity-providing orders in the context of exchanges) will attract more buyers of those services (liquidity takers in the form of marketable orders), which in turn generates more transactions, the source of the exchange’s revenue (either directly through transaction fees, or indirectly through data fees). As the Proposing Release acknowledges:

A major component of the market to provide trade executions is the competition among exchanges in attracting competitively priced liquidity as a means of

⁷⁹ Proposing Release, p. 122 (“The proposed banning of volume discounts, when considered in isolation, may have the effect of reducing efficiency if high-volume exchange members reduce the amount of order flow which they execute on the exchanges, something which could harm investor welfare.”), p. 127 (“Applying the insights from the price discrimination literature to the exchange setting suggests that the proposed ban on volume-based pricing may decrease both overall order flow across exchanges and overall efficiency, defined in terms of profit summed across broker-dealers and the exchanges.”), p. 129 (“Order flow externality reinforces the initial loss of surplus from shutting down volume-based price discrimination, resulting in further loss of efficiency, for dominant exchanges and their participants alike.”).

capturing more order flow. Competitive quotes increase the likelihood that marketable orders will flow to an exchange which result in trades.⁸⁰

64. The SEC recognizes that competition between exchanges for liquidity has led to the predominance of the maker-taker model, which offers rebates to incentivize members to route liquidity-providing orders to a given exchange:

The competitive environment that has emerged from the desire to attract competitively priced liquidity contributes to the predominance of maker-taker pricing across exchanges.⁸¹

The maker-taker transaction pricing model and higher rebates play an important role in attracting competitively priced quotes and capturing market share.⁸²

65. The SEC also acknowledges that volume-based pricing is an important component of how exchanges compete for liquidity within the maker-taker model:

The Commission understands that exchanges make use of volume-based tiers as a means of encouraging their members to execute orders on their venue. Volume-based tiers encourage exchange members to concentrate, or execute a larger share of their order flow, on the exchange in order to qualify for the higher rebates or lower fees offered by higher volume pricing tiers.⁸³

66. The SEC notes that this is consistent with how the economic profession understands the use of volume-based pricing for two-sided platforms.⁸⁴

67. Given that volume-based pricing helps attract liquidity to exchanges, the SEC acknowledges that banning it would likely lead to the migration of volume off-exchange:

The proposed prohibition of volume-based pricing for agency-related order flow by exchanges would risk exchanges losing market share to off-exchange venues. In addition to competing with other exchanges, exchanges also use volume-based pricing tiers as a means of competition for order flow with off-exchange market

⁸⁰ Proposing Release, p. 69

⁸¹ Proposing Release, p. 69.

⁸² Proposing Release, p. 73.

⁸³ Proposing Release, p. 76.

⁸⁴ "Offering a steeper volume-based pricing discount, or lower per-unit prices for greater utilization, has been documented as a means to attract demand to platforms in other market settings." Proposing Release, pp. 119–120.

centers such as wholesalers and ATSS. Lacking the ability to offer volume discounts on agency-related order flow may make exchanges less competitive.⁸⁵

68. Again, the SEC’s conclusions are consistent with the literature on two-sided platforms.⁸⁶

69. Migration of volume off-exchange may have first order effects on all equity market participants. The Proposing Release identifies a number of adverse effects due to migration of liquidity off-exchange, including the reduction of displayed liquidity, widening of bid-ask spreads, increased trading costs, and worsening execution quality off-exchange.

70. First, the SEC explains that “the proposed banning of volume discounts, when considered in isolation, may have the effect of reducing efficiency if high-volume exchange members reduce the amount of order flow which they execute on the exchanges, something which could harm investor welfare.”⁸⁷ While the SEC presents its conclusion as being conditional, that is, “*if* high-volume exchange members reduce the amount of order flow which they execute on exchanges,” this is indeed what one would actually expect to occur. High-volume exchange members receive the largest volume discounts—that is, keeping everything else constant,⁸⁸ they would suffer the greatest loss of incentives to route to the exchange. Moreover, they likely already have established relationships with off-exchange venues they would view as attractive alternatives. As noted above, many of the high-volume exchange members who would be affected by the rule also run their own execution venues in the form of ATSS. The SEC acknowledges that the loss of these incentives would lead to off-exchange migration:

Not being able to realize preferential pricing offered by the highest volume-based tier for the agency portion of their order flow higher volume exchange members may instead face less attractive pricing thereby making off-exchange venues relatively more attractive.⁸⁹

71. Migrating volume liquidity off-exchange to either ATSS or off-exchange market makers would be easy for the members who currently qualify for volume-based pricing and provide

⁸⁵ Proposing Release, p. 126.

⁸⁶ “Freeing up agency flow from the effects of volume-based tiers could result in fewer agency orders routed to exchanges. This view is manifested by both standard screening games from the mechanism design literature and price discrimination models, which suggest that volume-based price discrimination, particularly those based on absolute pricing tiers, can increase total demand for the platforms.” Proposing Release, p. 127.

⁸⁷ Proposing Release, p. 122.

⁸⁸ Routing decisions are due to a complex combination of many factors including execution quality and rebates.

⁸⁹ Proposing Release, p. 126.

large amounts of liquidity to exchanges. As the SEC explains, these exchange members have already made the fixed-cost investments into connecting to these venues.⁹⁰ In addition, many of these members also run their own ATSS or off-exchange market-making platforms. The Proposing Release highlights a study in which Nasdaq experimented with reducing access fees and rebates on a subset of stocks.⁹¹ Following the reduction in fees and rebates, liquidity measures for those stocks declined and Nasdaq lost market share in those stocks. Thus, evidence suggests that if exchanges were limited in offering volume-based pricing, members who currently receive volume-based rebates could implement alternative routing relatively quickly.

72. This migration of volume off-exchange by high-volume exchange members will impose negative externalities on the rest of the market. The SEC explains:

As high-volume exchange members likely contribute substantially more to the depth of book on an exchange, a withdrawal of agency order flow on exchanges by these members may lower the overall displayed liquidity provision imposing a negative externality on other exchange members.⁹²

High-volume exchange members play an outsized role in providing liquidity on exchanges. All exchange members benefit from positive externalities due to the participation of large liquidity providers. In the same way that a platform can kick off a virtuous cycle by attracting sellers who in turn attract buyers, and so on, the loss of sellers can generate a vicious cycle. Fewer sellers make a platform unattractive to buyers, which in turn could make even the remaining sellers go elsewhere. Thus, the Proposed Rule is likely to reduce overall exchange liquidity, to the detriment of investors who trade on exchanges.

73. Second, the SEC acknowledges that a reduction in concentration of trading volume would lead to higher trading costs for investors. In the context of two-sided markets such as

⁹⁰ Proposing Release, pp. 112, 113.

⁹¹ Proposing Release, p. 74 (citations omitted) (“In this experiment, the exchange unilaterally reduced both access fees and rebates for a set of 14 stocks. Over the course of the experiment Nasdaq reported a significant drop in a number of liquidity provision measures. Per the Nasdaq reports, the average number of shares displayed by Nasdaq at the NBBO in the experiment declined by 45%, average time at the NBBO declined by 4.7 percentage points from 92.7% to 88.0%, liquidity share fell from 29% to 19%, and the share of liquidity provided by the exchange’s top five liquidity providers prior to the experiment decreased from 44.5% to 28.7%.”), p. 75 (. “Both the Nasdaq reports and the Swan Study found that Nasdaq’s market share fell in traded stocks, with Nasdaq reporting an average decline of 1.8 percentage points. The Swan Study found that the Nasdaq share loss was captured by the two highest rebate-paying stock exchanges.”) .

⁹² Proposing Release, p. 123.

exchanges, concentration of trading volume is welfare-improving because it lowers trading costs. Concentration of trading volume makes it easier for liquidity takers to find liquidity providers.

As the Proposing Release states:

Coalescence on the larger exchanges is not only desirable for the exchanges but also increases the value of participating on each exchange, as trades are easiest to arrange on good terms in liquid markets. Having more consolidated markets under volume-based price tiers makes it easier for liquidity demand to meet liquidity supply on the same platform, lowering transaction costs.⁹³

74. On the flip side, reducing concentration will have the opposite effect and could lead to higher transaction costs for all investors, whether they trade on an agency or principal basis.

Again, the Proposing Release correctly reasons:

Conversely, loss of agency order flow from shutting down volume-based pricing could make the search for best price more costly for the remaining participants (both agency and principal) on an exchange, who might in turn decide to redirect orders away from dominant exchanges.⁹⁴

75. As described above, liquidity externalities would also amplify the negative impact of reduced concentration on trading costs. The SEC adds that “[o]rder flow externality reinforces the initial loss of surplus from shutting down volume-based price discrimination, resulting in further loss in efficiency, for dominant exchanges and their participants alike.”⁹⁵

76. Third, the SEC hypothesizes that the migration of liquidity off-exchange could lead to the widening of bid-ask spreads for the whole market, across both on- and off-exchange venues. At the most basic level, fewer traders willing to post displayed liquidity on exchanges mechanically results in wider spreads. The NBBO that is set by exchanges on the basis of their displayed liquidity is, in turn, used by off-exchange venues to set their own prices. Thus, the effects of wider spreads on exchanges propagate to off-exchange platforms as well. The Proposing Release explains that “as off-exchange market centers such as wholesalers often benchmark trades (and price improvement) to the NBBO, the withdrawal of a portion of on-exchange order flow may

⁹³ Proposing Release, p. 129.

⁹⁴ Proposing Release, p. 129.

⁹⁵ Proposing Release, p. 129.

potentially result in wider (NBBO) spreads thereby harming execution quality in the market as a whole.”⁹⁶

77. The effect of off-exchange migration causing wider spreads is consistent with the academic literature studying executions on- versus off-exchange. Bid-ask spreads are a measure of costs for transaction services. Thus, wider bid-ask spreads represent a cost increase for all market participants. Researchers have found that “high levels of dark trading increase adverse selection risk in the lit market, leading to wider bid-ask spreads.”⁹⁷ Others have argued that the separation of dark pools from exchanges concentrates informed trades in the latter, which tends to “worsen adverse selection on the exchange, leading to wider spreads and higher price impacts.”⁹⁸

78. Fourth, some of the academic literature suggests that a migration of trading volume from exchanges to off-exchange venues could have an adverse effect on price discovery. Price discovery is the process through which new information about the value of an asset becomes impounded in the market price of the asset, so that asset prices fully and efficiently reflect all information about value. Investors rely on price discovery to facilitate the efficient allocation of capital in equity markets. Some researchers have found that greater off-exchange trading could lead to less price discovery.⁹⁹ The SEC has also previously recognized that disincentives for investors to display limit orders can negatively affect price discovery.¹⁰⁰ The SEC’s Division of Trading and Markets has stated that “[t]o the extent that exchanges lose market share to non-displayed venues, then the public price discovery process could be further impaired.”¹⁰¹

79. Fifth, the SEC notes various negative effects of the Proposing Release on allocative efficiency, as measured by consumer surplus. Allocative efficiency is a standard concept when

⁹⁶ Proposing Release, p. 129.

⁹⁷ Carole Comerton-Forde and Tālis J. Putniņš, “Dark trading and price discovery,” *Journal of Financial Economics*, Volume 118, Issue 1, 2015, Pages 70-92. (“Comerton-Forde and Putnins (2015)”)

⁹⁸ Haoxiang Zhu, “Do Dark Pools Harm Price Discovery?” *The Review of Financial Studies*, Volume 27, Issue 3, March 2014, Pages 747–789. See also Markus Baldauf and Joshua Mollner, “Trading in Fragmented Markets,” *Journal of Financial and Quantitative Analysis*. 2021;56(1):93-121.

⁹⁹ “The reduction in uninformed traders in the lit market, accompanied by wider spreads, reduces incentives for costly information acquisition given that informed traders are less able to trade in the dark than uninformed traders. Therefore, dark trading could decrease the aggregate amount of information produced about fundamental values.” See Comerton-Forde and Putnins (2015).

¹⁰⁰ Securities and Exchange Commission, Regulation NMS, Release No. 34-51808, p.78 (noting that disincentives for investors to display limit orders “ultimately could negatively affect price discovery and market depth and liquidity”).

¹⁰¹ Securities and Exchange Commission, Division of Trading and Markets, “Maker-Taker Fees on Equities Exchanges,” October 20, 2015.

analyzing the welfare impact of any policy action. It speaks to the distribution of resources within an economy, accounting for the demands of consumers (in this case, the demands of exchange members and their customers to buy and sell equities) and the cost of production to meet those demands (here, the cost of running the platforms that facilitate trading). One way to measure allocative efficiency is to compare the outcomes for both consumers (exchange members) and producers (exchanges) under different policy regimes.

80. The SEC states that “the overall welfare effects of banning price discrimination are ambiguous and can vary across market settings.”¹⁰² While this may be true in the abstract, much can be done to assess the likely direction on the effect in a particular market setting. In this instance, a conclusion that banning volume-based pricing would be beneficial appears unwarranted. As part of its analysis, the SEC summarizes the consensus view in the economic literature that volume-based pricing generally increases allocative efficiency, and concludes that its removal in this context could have negative effects:

Applying the insights from the price discrimination literature to the exchange setting suggests that the proposed ban on volume-based pricing may decrease both overall order flow across exchanges and overall efficiency, defined in terms of profit summed across broker-dealers and the exchanges.¹⁰³

Tiered pricing can heighten the incentive to add liquidity to exchanges, enhancing not only total order flow and profit summed across the exchanges but also total broker-dealers’ welfare. Prohibiting tiered pricing may shrink exchanges’ overall profitability, to the detriment of broker-dealers as well.¹⁰⁴

81. However, the SEC then hypothesizes a theoretical countervailing effect:

The effects of the proposed elimination of volume-based transaction pricing tiers for agency-related trades could improve transaction quality and market efficiency by alleviating an impediment to switching the routing of orders from one exchange to another.¹⁰⁵

¹⁰² Proposing Release, p. 143.

¹⁰³ Proposing Release, p. 127.

¹⁰⁴ Proposing Release, p. 128.

¹⁰⁵ Proposing Release, p. 143.

The SEC does not even provide anecdotal evidence for this effect, let alone any systematic, scientific evidence or quantitative analysis. The SEC has no basis to assume that volume-based pricing does in fact present “an impediment to switching” or that removing it would “improve transaction quality and market efficiency.” Moreover, the SEC recognizes that “variation in rebates and fees across exchanges would likely continue to exist and be one factor that influenced the routing decisions of brokers.”¹⁰⁶

82. Sixth, while the SEC does not state that the Proposed Rule will have a negative impact on capital formation, its own findings again lean towards that conclusion. The SEC claims “the proposed rules would have a modest impact on capital formation.”¹⁰⁷ However, it reasons that “to the extent the proposed rules reduce transaction costs, they would increase the efficiency of trading, which may lead to better capital allocation.”¹⁰⁸ By the same logic, if the Proposed Rule *increases* transaction costs, it would *decrease* the efficiency of trading and lead to *worse* capital allocation. As described above, the SEC identified multiple channels by which the Proposed Rule would in fact *increase* transaction costs and *decrease* the efficiency of trading. In other words, the SEC’s analysis suggests the Proposed Rule could have a harmful effect on capital formation. The SEC has neglected to evaluate the likely magnitude of this effect, nor has it provided an explanation for why it believes it will be small.

83. Finally, the SEC also speculated that the Proposed Rule could increase the amount of principal trading and potential for systemic risk.¹⁰⁹ While the SEC makes no attempt to quantify the effect, it seems to be another consideration that weighs against the rule.

B. Quantitative analysis of Nasdaq data indicates risk that the adverse effect is likely to be large.

84. The SEC has recognized that if the Proposed Rule is adopted, it would incentivize liquidity to migrate to off-exchange venues. However, the Proposing Release does not evaluate how much liquidity is potentially at risk of migrating off-exchange. This section presents new analysis, based on data from Nasdaq, designed to evaluate how much liquidity (the “make” side

¹⁰⁶ Proposing Release, p. 143.

¹⁰⁷ Proposing Release, p. 152.

¹⁰⁸ Proposing Release, p. 152.

¹⁰⁹ Proposing Release p. 124.

of executed volume) is currently being provided by members who qualify for the best volume-based prices. This analysis finds that for trades executed on Nasdaq and Nasdaq PSX, a substantial proportion of the liquidity is provided by members who qualified for the highest volume-based rebates. Analysis of Nasdaq's quote data finds that when Nasdaq is quoting at the NBBO, these high-volume members contribute substantial proportion Nasdaq's quoted depth at the NBBO. Further analysis quantifies the extent to which Nasdaq's quote would widen if some or all of this order flow were to migrate off-exchange.

1. Members who receive the highest volume-based rebates provide a substantial proportion of the liquidity for executed trades on Nasdaq and PSX.

85. To assess the potential impacts of high-volume members migrating order flow off exchange, this analysis identifies members who qualified for the highest volume tiers, based on data provided by Nasdaq. Roughly 9% of Nasdaq members who traded every day qualified for the highest liquidity rebates.¹¹⁰ At the aggregate level, these members were the liquidity providers for 74% of all shares traded on Nasdaq in Q3 2023. This 74% decomposes into roughly 25% provided as principal and 49% provided as agency or riskless principal (agency-related). Further analysis suggests that the participation of these members is particularly important for the liquidity of certain small-cap stocks, which tend to be more thinly traded.

86. This analysis is based on a data extract from Nasdaq which summarizes transaction data for all exchange members across a set of tickers traded on Nasdaq in Q3 2023.¹¹¹ The data record executed transaction volume by exchange member in each stock ticker symbol, and allow one to distinguish between different categories of orders defined on three dimensions, based on whether the orders (1) added or removed liquidity; (2) were entered in an agency, riskless principal (together considered agency-related), or principal capacity; and (3) were displayed, non-displayed, set the NBBO when placed, or were pegged to the midpoint. The data report three measures for every exchange member/ticker/order category: (1) fees paid or rebates received, (2)

¹¹⁰ As described in more detail below, members who received high liquidity rebates are defined as those who received 30mils (\$0.0030) per share or more in rebates for their executed displayed liquidity-adding orders for shares trading at more than \$1.

¹¹¹ Members are aggregated to the level at which volume-based pricing is applied.

number of shares traded, and (3) dollar volume traded. The analysis only includes trades where the share price is over \$1. Trades over \$1 on Nasdaq receive different liquidity rebates depending on the volume-based pricing schedule. The analysis covers almost 10,000 tickers, 188 billion shares traded, and \$11.8 trillion of total dollar volume. I understand that all this information is available to the SEC through the Consolidated Audit Trail (“CAT”) for all exchanges.

87. This analysis considers four measures of liquidity:

- a. Total add volume – the most aggregated measure, this includes trades against all types of passive liquidity-providing orders available on Nasdaq. These include displayed and non-displayed orders, as well as orders entered at different levels of the order book.
- b. Total displayed add volume – this definition only counts trades against displayed orders. Displayed orders are important to exchanges because they are visible to all market participants. Furthermore, only displayed orders on exchanges can determine the NBBO.
- c. Add volume that set the NBBO – this counts trades against displayed orders that set the NBBO when they were entered. In other words, this captures trades against orders that directly impacted the NBBO. Orders that affect the NBBO are relevant to the whole equity market because the NBBO bid-ask spread price is used as a market-wide measure of the quoted bid-ask spread, and changes to the NBBO mid-price represent a measure of market-wide price-discovery.
- d. Add volume that set or is placed inside the NBBO – in addition to the orders that set the NBBO when they are entered, this measure also counts trades executed against hidden orders pegged to the midpoint inside the NBBO. These orders represent all price-improving liquidity available on Nasdaq. They are attractive to liquidity demanders because executing against them implies an execution price that either set the NBBO (and therefore improved on the previous NBBO) or is at the mid (and therefore better than the NBBO).

88. The analysis considers exchange members who received the highest rebates for their executed displayed orders as those who received an average rebate of 30mils (\$0.0030) per share

or more.¹¹² High rebates are defined as a function of displayed orders because, from an economics perspective, these are the orders that platforms are trying to attract with volume-based pricing. Displayed orders are visible to all market participants and are expected to generate the greatest liquidity externalities. Exchanges often offer the largest rebates for displayed liquidity-adding orders. For context, the highest take fee on Nasdaq is 30mils (\$0.0030) per share.¹¹³ In other words, these liquidity providers receive more from Nasdaq than Nasdaq can charge liquidity takers. Given the liquidity externalities generated by large members, it may be economically rational for exchanges to incur a cost to attract these large members to the platform by offering them liquidity rebates that exceed take fees. In my data, about 9% of member firms trading every day on Nasdaq received 30mils (\$0.0030) per share or more in rebates on their executed displayed liquidity-adding orders. These member firms either operate their own ATSS or appear to be off-exchange market makers.

89. First, the analysis shows that liquidity-adding orders from members who receive the highest volume-based rebates are a large, economically meaningful source of liquidity on Nasdaq, across four different categories of liquidity-providing orders. Table 1 shows the proportion of traded volume in the data (as measured by both dollar amount and number of shares) that involved a liquidity-providing order entered by exchange members who received the highest rebates. This table covers the four measures of liquidity described above, considering both agency-related and principal orders entered by members who received high rebates. This table considers both agency-related and principal volume because while the latter is not the target of the Proposed Rule, both agency-related and principal volume are considered for calculating volume-based pricing, and exchange members are likely to consider both types of volume when making routing decisions. The Proposing Release recognizes that principal and agency-related volume are tied together and documents this effect:

Exchange members with large principal order flow also tend to have large agency order flow which is consistent with greater liquidity provision of either kind encouraging liquidity provision from the other order type. The majority of

¹¹² Only including shares that trade over \$1. Trades over \$1 receive different liquidity rebates depending on the volume-based pricing schedule. Excluding trades against designated retail liquidity, which are a special type of order to indicate orders entered by retail investors.

¹¹³ 30mils is also the highest take fee allowed by the SEC.

exchange members with principal order flow also route agency orders to the same exchange.¹¹⁴

Therefore, all volume from these members (agency-related and principal) could be affected by the Proposed Rule and at risk of moving off-exchange if volume-based incentives are banned.

Table 1: Proportion of Nasdaq Volume Provided by Members Receiving an Average Rebate on Displayed Add Liquidity of 30mils/share or More in Q3 2023

	Liquidity Category			
	All Added	Displayed	NBBO-Set	NBBO-Set or Midpoint
Number of Shares	74.0%	74.7%	74.9%	81.3%
Dollar Volume	72.7%	75.4%	70.3%	73.1%
Average by Ticker	57.6%	58.6%	57.9%	57.9%

Source: Nasdaq

Note: The average rebate on displayed add liquidity for a member is calculated on the subset of trades above \$1 for which that member provided add displayed liquidity, excluding trades where liquidity was provided as Designated Retail Liquidity. The average rebate is calculated by dividing the total net rebate received on those trades by the number of shares traded. For each liquidity category, the proportion of volume is calculated as the volume of trades for which liquidity was provided by the members defined above divided by the total volume of trades. The All Added category contains trades against all add liquidity orders. This also includes trades against displayed and various non-displayed orders. The Displayed category contains trades against add displayed liquidity orders. The NBBO-Set category contains trades against add displayed liquidity orders that set the NBBO when entered. The NBBO-Set or Midpoint category contains trades against add displayed liquidity orders that set the NBBO when entered and midpoint orders (which are non-displayed).

90. The results in Table 1 are consistent across volume as measured in number of shares and in dollar terms. Looking just at number of shares traded:

- a. Total add volume – 74.0% of all trades against liquidity-adding orders were against orders entered by members who received 30 mils (\$0.0030) per share or more in rebates.
- b. Total displayed add volume – 74.7% of all trades against displayed liquidity-adding orders were against orders entered by members who received 30 mils (\$0.0030) per share or more in rebates.
- c. Add volume that set the NBBO – 74.9% of all trades against displayed liquidity-adding orders that set the NBBO were against orders entered by members who received 30 mils (\$0.0030) per share or more in rebates.

¹¹⁴ Proposing Release, p. 118.

- d. Add volume that set or is placed inside the NBBO – 81.3% of all trades against either displayed liquidity-adding orders that set the NBBO, or hidden midpoint orders were against orders entered by members who received 30 mils (\$0.0030) per share or more in rebates.

91. Second, even limiting to agency-related orders, my analysis shows that liquidity-adding orders entered in an agency-related capacity by members who receive the highest volume-based rebates are a large, economically meaningful source of liquidity on Nasdaq, across four different categories of liquidity-providing orders. This is not surprising because at an aggregate level, about 66% of trades are against liquidity-providing orders entered in an agency-related capacity, with the remaining 34% entered in a principal capacity. Table 2 shows the same measures as Table 1 but considers only trades against agency-related orders entered by members who receive high rebates as a proportion of all trades (*i.e.*, both agency-related and principal) involving orders for a given order category.

Table 2: Proportion of Nasdaq Volume Against Agency-Related Orders Provided by Members Receiving an Average Rebate on Displayed Add Liquidity of 30mils/share or More in Q3 2023

	Liquidity Category			
	All Added	Displayed	NBBO-Set	NBBO-Set or Midpoint
Number of Shares	48.6%	49.8%	40.4%	48.6%
Dollar Volume	47.9%	50.9%	44.4%	48.8%
Average by Ticker	38.7%	41.8%	34.5%	39.0%

Source: Nasdaq

Note: The average rebate on displayed add liquidity for a member is calculated on the subset of trades above \$1 for which that member provided add displayed liquidity, excluding trades where liquidity was provided as Designated Retail Liquidity. The average rebate is calculated by dividing the total net rebate received on those trades by the number of shares traded. For each liquidity category, the proportion of volume is calculated as the volume of trades for which liquidity was provided from agency-related orders by the members defined above divided by the total volume of trades against agency-related orders. The All Added category contains trades against all add liquidity orders. This also includes trades against displayed and various non-displayed orders. The Displayed category contains trades against add displayed liquidity orders. The NBBO-Set category contains trades against add displayed liquidity orders that set the NBBO when entered. The NBBO-Set or Midpoint category contains trades against add displayed liquidity orders that set the NBBO when entered and midpoint orders (which are non-displayed).

92. Again, the results in Table 2 are consistent across volume as measured in number of shares and in dollar terms. Looking just at number of shares traded:

- a. Total add volume – 48.6% of all trades against liquidity-adding orders were against agency-related orders entered by members who received 30mils (\$0.0030) per share or more in rebates.
- b. Total displayed add volume – 49.8% of all trades against displayed liquidity adding orders were against agency-related orders entered by members who received 30mils (\$0.0030) per share or more in rebates.
- c. Add volume that set the NBBO – 40.4% of all trades against displayed liquidity-adding orders that set the NBBO were against agency-related orders entered by members who received 30mils (\$0.0030) per share or more in rebates.
- d. Add volume that set or is placed inside the NBBO – 48.6% of all trades against either displayed liquidity-adding orders that set the NBBO, or hidden midpoint orders were against agency-related orders entered by members who received 30mils (\$0.0030) per share or more in rebates.

93. The results above are broadly consistent across all tickers and not driven by a subset of high-volume tickers. Tables 1 and 2 also report the proportion of trades against each category of liquidity-providing orders, averaged across tickers—that is, calculating the proportion for each ticker, and taking an equal-weighted average, regardless of the size of the ticker. As shown in the third row of the two tables, liquidity-adding orders entered in an agency-related capacity from members who receive the highest volume-based rebates are a large, economically meaningful source of liquidity *for the average ticker* on Nasdaq.

94. Third, a deeper dive reveals that the participation of these members could be particularly important for the liquidity of small-cap stocks, which tend to be more thinly traded. For certain tickers, virtually all the liquidity for these tickers is provided by high rebate members. In particular, for stocks in the lowest quartile by market cap in the data, 244 tickers have more than 90% of their trades against liquidity-providing orders entered by high rebate members, and 194 tickers have more than 95% of their trades against liquidity-providing orders entered by high rebate members. For comparison, for stocks in the largest quartile by market cap in the data, only four tickers have more than 90% of their trades against liquidity-providing orders entered by high rebate members, and none have more than 95% of their trades against liquidity-providing orders entered by high rebate members. Thus, the Proposed Rule might have an outsized impact

on certain small-cap stocks. Given that it may be harder to incentivize liquidity for more thinly traded small-cap stocks, the SEC should pay particular attention to potential negative effects of the Proposed Rule on the on-exchange liquidity for these stocks. The Proposing Release does not contain any such analysis.

95. Fourth, a similar analysis of the PSX exchange yields qualitatively similar results: liquidity-adding orders from members who receive the highest volume-based rebates are a large, economically meaningful source of liquidity. While PSX is much smaller than Nasdaq, with less than 1% market share according to Table 4 in the Proposing Release, it could still experience the same adverse effects as Nasdaq. At the aggregate level, members who received the highest liquidity rebates were the liquidity providers for 45.4% of all shares traded on PSX.¹¹⁵ Table 3 shows the detailed results for PSX, which are largely consistent with those for Nasdaq.¹¹⁶ However, on PSX, fewer members received 30mils (\$0.0030) per share or more in rebates for shares executed against their displayed orders, compared to Nasdaq. To the extent smaller exchanges depend on fewer members for liquidity, they may be even more susceptible to adverse effects than the larger exchanges. While the Proposing Release claims that “[l]ower volume exchanges would be most likely to benefit from a decrease in the concentration of agency order flow,”¹¹⁷ it does not present a quantitative analysis of the impact of high rebate members migrating off-exchange.

¹¹⁵ As before, members who received high liquidity rebates are defined as those who received 30mils (\$0.0030) per share or more in rebates for their executed displayed liquidity-adding orders. The analysis only includes trades where the share price is over \$1.

¹¹⁶ PSX does not have an NBBO-set program and *de minimis* volume executed against midpoint peg orders so the analysis considers only all added and displayed liquidity.

¹¹⁷ Proposing Release, p. 115.

Table 3: Proportion of PSX Volume Provided by Members Receiving an Average Rebate on Displayed Add Liquidity of 30mils/share or More in Q3 2023

	Liquidity Category	
	All Added	Displayed
Number of Shares	45.4%	48.8%
Dollar Volume	46.5%	49.5%
Average by Ticker	27.1%	29.5%

Source: Nasdaq

Note: The average rebate on displayed add liquidity for a member is calculated on the subset of trades above \$1 for which that member provided add displayed liquidity. The average rebate is calculated by dividing the total net rebate received on those trades by the number of shares traded. For each liquidity category, the proportion of volume is calculated as the volume of trades for which liquidity was provided by the members defined above divided by the total volume of trades. The All Added category contains trades against all add liquidity orders. This also includes trades against displayed and various non-displayed orders. The Displayed category contains trades against add displayed liquidity orders.

2. Members who receive the highest volume-based rebates make up a substantial proportion of quoted volume for Nasdaq at the NBBO.

96. Consistent with the results presented above, an analysis of quoted volume shows that members who receive the highest volume-based rebates make up a substantial proportion of quoted volume for Nasdaq at the NBBO. At the aggregate level, the approximately 9% of members trading every day who received the highest liquidity rebates made up about 70% of the quoted depth on Nasdaq when Nasdaq was quoting at the NBBO. This 70% decomposes into roughly 28% from principal orders and 42% from agency-related orders.

97. Tables 4 and 5 report analysis performed by Nasdaq to quantify the contributions of different members to quoted depth. This analysis identifies periods when Nasdaq is quoting at the NBBO and calculates the proportion of quoted size that is attributable to different members on Nasdaq. Concentrating on the periods when Nasdaq's quotes make up the NBBO is informative because it captures when Nasdaq is contributing to market-wide quoted depth. Thus, migration of volume off Nasdaq during these periods would have caused a market-wide reduction in liquidity. Table 4 considers all orders. Table 5 considers only agency-related orders.

Table 4: Proportion of Nasdaq Quoted Volume at the NBBO Provided by Different Members in Q3 2023

	Members Receiving an Average Rebate on Displayed Add Liquidity of	
	30 mils/share or More	Less than 30 mils/share
Number of Shares	70.3%	29.7%
Dollar Volume	75.2%	24.7%
Average by Ticker	56.0%	44.0%

Source: Nasdaq

Note: Analysis conducted by Nasdaq. At 10 second intervals over the trading day (9.30am to 4.00pm), whenever Nasdaq quotes were at the NBBO, the Nasdaq quoted volume at the NBBO was apportioned between members receiving an average rebate on displayed add liquidity of either 1) 30 mils/share or more, or 2) less than 30 mils/share. A daily average proportion was calculated for each ticker. The daily average proportions for each ticker were aggregated across the trading days in Q3 2023 by taking the average: 1) weighted by the number of shares traded on each day for each ticker, 2) weighted by the dollar volume of shares traded on each day for each ticker, and 3) without weights, *i.e.*, the simple average.

Table 5: Proportion of Nasdaq Quoted Volume at the NBBO Provided by Different Members in Q3 2023 using Agency-Related Orders

	Members Receiving an Average Rebate on Displayed Add Liquidity of	
	30 mils/share or More	Less than 30 mils/share
Number of Shares	42.2%	15.7%
Dollar Volume	47.2%	14.5%
Average by Ticker	38.4%	24.1%

Source: Nasdaq

Note: Analysis conducted by Nasdaq. At 10 second intervals over the trading day (9.30am to 4.00pm), whenever Nasdaq quotes were at the NBBO, the Nasdaq quoted volume at the NBBO was apportioned between members receiving an average rebate on displayed add liquidity of either 1) 30 mils/share or more, or 2) less than 30 mils/share. That volume was further apportioned between agency-related and principal orders. A daily average proportion due to agency-related orders was calculated for each ticker. The daily average proportions for each ticker were aggregated across the trading days in Q3 2023 by taking the average: 1) weighted by the number of shares traded on each day for each ticker, 2) weighted by the dollar volume of shares traded on each day for each ticker, and 3) without weights, *i.e.*, the simple average.

98. The results are consistent with findings from the previous section. Table 4 shows that when considering all order flow (both principal and agency-related), the 9% of members trading every day who received rebates of 30 mils (\$0.0030) per share or more on Nasdaq provided the majority of displayed depth when Nasdaq was quoting at the NBBO, across all three weighting schemes. Table 5 shows that the majority of this displayed volume was from agency-related trades routed through these members. In contrast, for the remaining members on Nasdaq who

received rebates of less than 30 mils (\$0.0030) per share, a smaller proportion of their contributions to Nasdaq quoted volume at the NBBO were due to agency-related orders.

99. The results presented in this section show that a large proportion of Nasdaq's liquidity at the NBBO is being provided by members that would likely have an incentive to migrate order flow off exchange under the Proposed Rule. While this analysis is based on Nasdaq quotes, the SEC has access to the data from every exchange and could analyze the displayed market as a whole. The Proposing Release neglects to present any empirical analysis of the potential impact of the Proposed Rule on quoted liquidity, despite the SEC having the data to be able to do so.

3. Quoted spreads on Nasdaq would likely widen if members who received the highest rebates migrated away.

100. As shown above, members who qualify for the highest liquidity rebates are currently providing a substantial proportion of the liquidity at the NBBO. In addition to reducing quoted depth, if this liquidity were to migrate off-exchange, this would likely also have an adverse effect on the NBBO spread. One way to understand the potential effect of migration on the NBBO spread would be to calculate a hypothetical quoted spread assuming certain quotes are removed, holding all else equal.¹¹⁸ Such an analysis conducted by Nasdaq suggests an economically significant impact of migration on spreads. In particular, Nasdaq's analysis found that spreads on Nasdaq could widen by about 1.0% if just 5% of orders from the members who qualify for the highest liquidity rebates migrated off Nasdaq.¹¹⁹ Furthermore, most of this effect (0.8%) obtains even if only agency-related volume from these members are considered.

101. In their comment letter on this Proposed Rule, Nasdaq developed an analysis to quantify the potential impact of removing certain agency-related orders to the quoted spread on the exchange, holding other orders constant.¹²⁰ Their analysis considered all agency-related orders on Nasdaq for S&P 500 tickers, regardless of which member submitted the order. Nasdaq has now

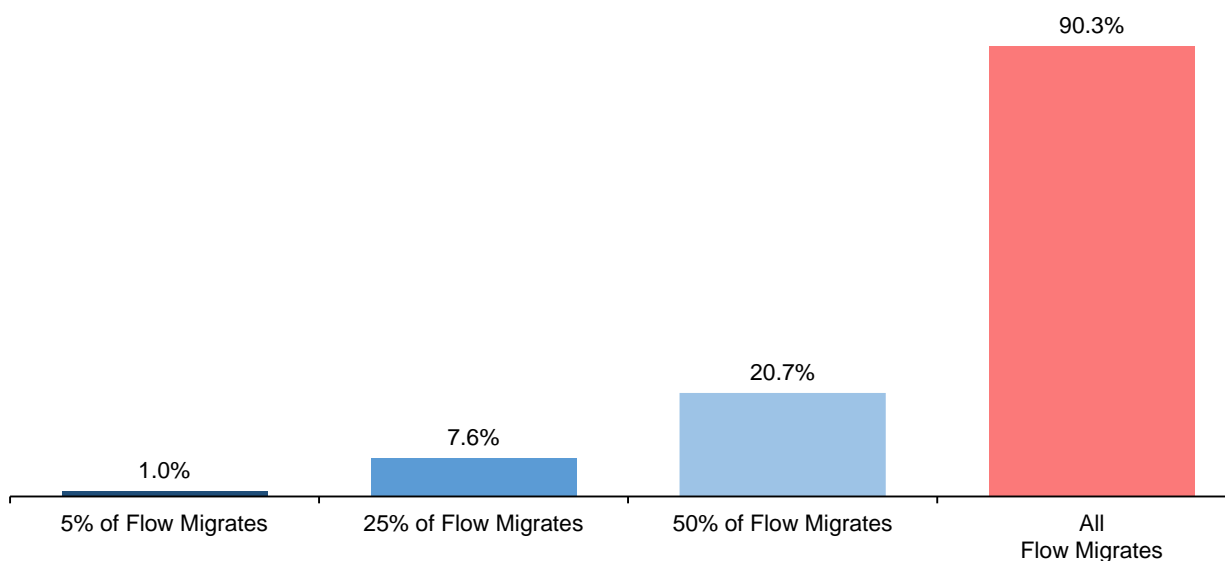
¹¹⁸ To fully analyze the potential effect, one would also need to consider many other factors, including the equilibrium response by other members who remain, and the incentive for them, or other members who could enter, to improve their quotes in the absence of the larger members.

¹¹⁹ An increase in spreads of 1.0% is economically significant in the context of equity markets. The Nasdaq Letter reports a separate analysis which estimated that a decrease in spreads of 1 basis point could save \$2.2 billion in mutual fund shortfall and lower cost of capital for issuers by \$3.6 billion. For See Nasdaq Letter FN 71, citing Phil Mackintosh, "How much Does Trading Cost the Buy Side?" dated February 16, 2022. For comparison, the 1.0% increase in the average Nasdaq spread corresponds to about 0.08 basis points.

¹²⁰ See Letter from Nasdaq dated December 20, 2023, p.17.

extended their analysis to focus on orders submitted by members who receive the highest liquidity discounts, who are most likely to be affected by the Proposed Rule. Figures 1 and 2 report the hypothetical impact of off-exchange migration of 5%, 25%, 50%, and 100% of flow from the approximately 9% of members trading every day who receive add displayed liquidity rebates of 30 mils (\$0.0030) per share or more. Figure 6 considers all orders (principal and agency-related) from these members and Figure 7 considers only agency-related orders.

Figure 1: Average Increase in Nasdaq Bid-Ask Spread Due to Migration of Members Receiving an Average Rebate on Displayed Add Liquidity of 30mils/share or More in Q3 2023



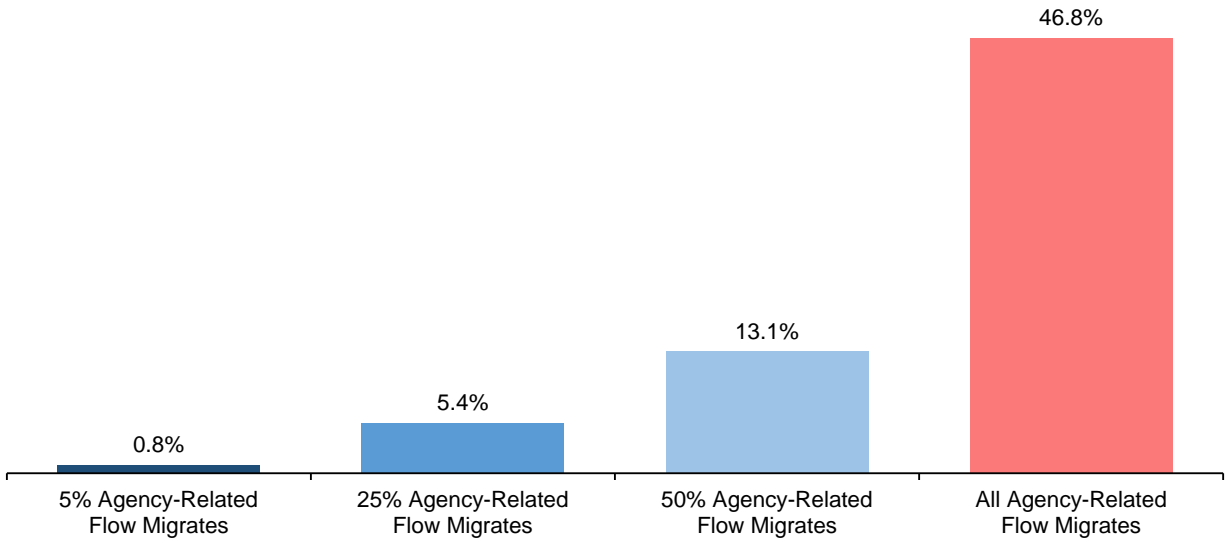
Source: Nasdaq

Note: Analysis conducted by Nasdaq for S&P 500 components in Q3 2023. 5%/25%/50%/ 100% of the displayed resting orders from members an average rebate on displayed add liquidity of 30 mils/share or more are randomly removed regardless of pricing. Snapshots of the Nasdaq order book are taken every 10 seconds from 9:30am to 4:00pm and the Nasdaq Best Bid and Offer was re-calculated without the removed orders.

102. These results show the degree to which Nasdaq’s quoted bid-ask spread might increase if the Proposed Rule were to induce the largest members (those who received rebates of 30 mils per share or more) to redirect a portion of their order flow elsewhere, everything else equal. The results show that even a modest amount of migration off-exchange would impact the spread. Figure 1 shows that for S&P 500 stocks, the average quoted spread would increase by about 1.0% if 5% of the (principal and agency-related) order flow from the largest members were to be routed elsewhere, everything else equal. If a higher percentage of orders were to migrate away, the potential impact on Nasdaq’s spread would be substantially larger. A large portion of this

result is driven by agency order flow. Figure 2 shows the potential impact on Nasdaq spreads if only agency-related flow were to leave the exchange.

Figure 2: Average Increase in Nasdaq Bid-Ask Spread Due to Migration of Agency-Related Orders from Members Receiving an Average Rebate on Displayed Add Liquidity of 30mils/share or More in Q3 2023



Source: Nasdaq

Note: Analysis conducted by Nasdaq for S&P 500 components in Q3 2023. 5%/25%/50%/ 100% of the displayed resting agency-related orders from members an average rebate on displayed add liquidity of 30 mils/share or more are randomly removed regardless of pricing. Snapshots of the Nasdaq order book are taken every 10 seconds from 9:30am to 4:00pm and the Nasdaq Best Bid and Offer was re-calculated without the removed orders.

103. These results suggest that there could be an economically significant widening of quoted spreads if quotes from members most directly affected by the Proposed Rule were to migrate their volume off-exchange. Again, while this analysis is based on Nasdaq quotes, the SEC has access to the data from every exchange and could analyze the displayed market as a whole. The Proposing Release neglects to present any empirical analysis of the potential impact of the Proposed Rule on quoted spreads, despite the SEC having the data to be able to do so.

V. The SEC’s economic analysis is inadequate and does not support adopting the Proposed Rule.

104. The economic analysis in the Proposing Release does not appear to provide any basis for the Commission to conclude that the Proposed Rule would be in the public interest, promote the mission of the SEC, or further the goals of the Exchange Act. Specifically,

- a. The Proposing Release fails to justify a need for rulemaking. It attempts to motivate the rule by mentioning a number of “concerns” but provides no empirical evidence or analysis of these concerns and how the Proposed Rule would address them. (See Section V.B.)
- b. The economic analysis describes the “baseline” against which benefits and costs should be evaluated as the current status quo. This ignores the fact that the Commission has recently proposed multiple other rules that, if adopted, might fundamentally change the economics of exchange pricing. (See Section V.C.)
- c. The Proposing Release’s economic analysis supports a conclusion that the benefits of the Proposed Rule do not justify the costs. It identifies a significant likelihood that it might have adverse effects on liquidity, execution quality, efficiency, and capital formation, and fails to demonstrate that the rule is likely to generate any substantive benefits. (See Section V.D.)
- d. The economic analysis does not provide evidence that the Proposed Rule would increase competition between exchanges. (See Section V.E.)

A. High-quality economic analysis is important in the rulemaking process.

105. High-quality economic analysis is an important tool for helping the Commission determine whether a proposed rule is “necessary or appropriate in the public interest,” and helps the Commission ensure that its rules help promote its mission to protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation. As part of the rulemaking process, the Commission is required to consider whether the proposed rule will promote efficiency, competition, and capital formation.

106. For rulemaking under the Exchange Act, there are further requirements that specifically require economic analysis of competition—Section 23(a)(2) requires the Commission to consider the impact the rule would have on competition and prohibits the Commission from adopting any rule that would impose any burden on competition not necessary or appropriate in furtherance of the purposes of the Exchange Act.

107. Internal guidance developed by SEC economists and Office of the General Counsel lays out the principles of how economic analysis should be implemented to help ensure that

“decisions to propose and adopt rules are informed by the best available information about a rule’s likely economic consequences,” and to help ensure the rulemaking process is done in a way consistent with the statutes.¹²¹

108. This guidance lays out four elements of a high-quality economic analysis:¹²²

- a. Clearly identify the justification for the proposed rule. Rule releases must include a discussion of the need for regulatory action and how the proposed rule will meet that need.
- b. Define the baseline against which to measure the proposed rule’s economic impact. The economic consequences of proposed rules (potential costs and benefits including effects on efficiency, competition, and capital formation) should be measured against a baseline, which is the best assessment of how the world would look in the absence of the proposed action.
- c. Identify and discuss reasonable alternatives to the proposed rule.
- d. Analyze the economic consequences of the proposed rule and the principal regulatory alternatives.

The SEC does not appear to have followed these principles in the Proposing Release.

109. In analyzing the likely consequences of the Proposed Rule and alternative regulatory approaches, rule writing staff should work with economists in the SEC’s Division of Economic and Risk Analysis (“DERA”) to (1) identify and describe the most likely economic benefits and costs of the Proposed Rule and alternatives; (2) quantify those expected benefits and costs to the extent possible; and (3) for those elements of benefits and costs that are quantified, identify the source or method of quantification and discuss any uncertainties.

B. The economic analysis fails to justify a need for a rule.

110. The Proposing Release motivates the Proposed Rule by articulating three potential “concerns”:

¹²¹ Securities and Exchange Commission, “Current Guidance on Economic Analysis in SEC Rulemakings,” March 16, 2012.

¹²² Securities and Exchange Commission, “Current Guidance on Economic Analysis in SEC Rulemakings,” March 16, 2012.

- a. First, the Commission is concerned about the impact of volume-based exchange transaction pricing, as it has expanded and evolved, on competition among exchange members, such as when broker-dealers are competing for customers.
- b. Second, the Commission is concerned that the desire to qualify for volume-based pricing exacerbates a conflict of interest between members and their customers when members route customers' orders for execution because the member can economically benefit from its routing decision.
- c. Finally, the Commission is concerned that volume-based pricing may impose a burden on exchange competition, especially when exchanges base pricing for an auction, trading session, or special program on volume submitted during regular trading hours outside that auction, trading session, or program.¹²³

111. Regarding the first of these “concerns,” the economic analysis in the release does not provide evidence that the market for broker-dealers competing for customers is not competitive. The Proposing Release confirms that there are thousands of registered broker-dealers, and at least 30 who have developed the technology to compete as executing brokers for NMS stocks. As discussed above, this market has all the hallmarks of a competitive market. The discussion in the Proposing Release focuses on the idea that volume-based pricing can affect the relative costs of exchange members who qualify for the best prices against those that do not. However, in a competitive market, changes in relative costs would just involve a redistribution across members, not a change in the level of competition that would increase total welfare, which is how economists would evaluate aggregate benefits of a rule.¹²⁴ More importantly, as discussed above, the broker-dealers who may be disadvantaged by volume-based pricing are not small broker-dealers, but those who are large enough to be exchange members but not large enough to qualify for the largest volume discounts. The economic analysis in the Proposing Release does not identify how many of these there are, whether they are the kind of broker-dealers who compete

¹²³ Proposing Release, p. 13.

¹²⁴ See, e.g., Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization*, 4th ed. (Pearson Education Limited, 2015), p. 95 (“One common measure of welfare from a market is the sum of consumer surplus and producer surplus. This measure of welfare is the value that consumers and producers would be willing to pay to purchase the equilibrium quantity of output at the equilibrium price.... [T]his measure of welfare is maximized at the competitive equilibrium.”), p. 659 (“The view that the guiding principle of the antitrust laws should be efficiency, rather than the taking of resources from one group and granting them to another, has gained increasing acceptance among legal and academic scholars.”).

for customers, whether the lower rebate has inhibited their ability to attract customers, or the extent to which the supposedly disadvantaged broker-dealers are able to achieve the benefits of volume discounts through another channel.

112. The Proposing Release also notes a decline in the number of registered broker-dealers from 4,450 in 2015 to 3,538 in 2022, and speculates that “[v]olume-based pricing may further contribute to this trend of increased concentration.”¹²⁵ Such logic ignores that the vast majority of the 3,538 registered broker-dealers do not carry customer accounts, are not exchange members, and do not act as executing brokers on exchanges.¹²⁶ To the extent that they route customer orders at all, the majority of smaller brokers route their orders to larger brokers, who handle the order flow as executing brokers. As explained in Section III.A., volume-based pricing is more likely to benefit, not harm, such smaller brokers and thus cannot explain a reduction in the number of registered broker-dealers.

113. Regarding the second “concern,” relating to potential conflicts of interest, the Proposing Release provides no evidence that these supposed conflicts of interest are inducing broker-dealers to route orders in a manner that is inconsistent with best execution or with the customers’ best interests. In fact, taken as given, the analysis presented in the Proposing Release finds that for non-marketable limit orders (which the SEC claims offer brokers greater discretion on routing decisions), agency-related order flow was less concentrated relative to the SEC’s benchmark than principal order flow when compared to that benchmark.¹²⁷ Based on this analysis, the SEC concludes that “it is therefore unclear if differences in order flow concentration between principal and agency order flow are attributable to broker-dealers acting on the conflict

¹²⁵ Proposing Release, p. 99.

¹²⁶ In 2022 there were only 187 broker-dealers that carried customer accounts, according to the SEC’s recent 15c3-3 release. According to the Proposing Release, about 30 large firms have developed the infrastructure and smart order routing technology necessary to handle execution on exchanges, and these firms account for about 99% of orders executed on exchanges. The Proposing Release recognizes that these economies of scale exist for reasons unrelated to exchange volume-based pricing. See Proposing Release, p. 113.

¹²⁷ “However, when measured relative to their benchmarks, agency related member HHI is only 11% greater than the pro-rata HHI whereas principal member HHI is 31% greater. Broker-dealers typically have more discretion when routing non-marketable orders since the routing of non-marketable orders is not directly constrained by the Order Protection Rule. Therefore, the fact that the difference between agency-related and principal HHIs appears to be smaller when only considering the execution of non-marketable limit orders suggests that the observed differences in concentration between agency-related and principal order flow may not be driven by routing decisions taken where broker-dealers have the most discretion.” Proposing Release, p. 95 (citations omitted).

of interest.”¹²⁸ Putting aside potential issues with the SEC’s approach,¹²⁹ the SEC’s findings do not support its theory that conflicts of interest are causing brokers to overly concentrate their order flow.

114. In a competitive market where brokers satisfy their best execution obligations and pass on the benefits of liquidity rebates by reducing commissions or using rebate revenues to fund other services that customers value, routing orders to minimize access fees and maximize rebates could be optimal for the customer. The Proposing Release provides no evidence that brokers are not complying with their best execution obligation. More importantly, prohibiting volume-based pricing will not eliminate this apparent conflict, as there will still be differences in fees across exchanges, as the Proposing Release itself recognizes.¹³⁰ The difference in liquidity rebates across the volume-based pricing schedule is small compared to the difference across exchanges, especially when inverted-fee exchanges are considered.

115. Regarding the third “concern” (*i.e.*, linking volume-based pricing across continuous and auction markets), again, the SEC is expressing a theoretical concern without any evidence that the status quo is not competitive or that the Proposed Rule would bolster rather than hinder competition. While the release dedicates some discussion to the idea that bundling can raise anti-competitive concerns in some situations, it fails to recognize (as described above) that bundling is often pro-competitive, and it fails to analyze whether the market for trading venues has the characteristics that would lead bundling to be pro- or anti-competitive. As described above, had it done this analysis, the SEC should have concluded that in this instance, linking auction fees to continuous market volume is not a cause for concern.

C. The economic analysis fails to define a meaningful baseline.

116. As described above, an important component of a high-quality economic analysis is specifying the baseline against which the impacts of the Proposed Rule would be measured. A natural and appropriate choice is to evaluate the impact of a proposal against the status quo

¹²⁸ Proposing Release, p. 92.

¹²⁹ For example, it is unclear why a pro-rata allocation of order flow is an appropriate benchmark for an individual broker since, as the Proposing Release admits, even principal order flow that is free from the purported conflicts of interest are not routed on a pro-rata basis (see Proposing Release, p. 95). Thus, it is difficult to provide an economic interpretation for a deviation from this benchmark that underpins the SEC’s analysis.

¹³⁰ “Variation in rebates and fees across exchanges would likely continue to exist and be one factor that influenced the routing decisions of brokers.” Proposing Release, p. 143.

baseline if the rule is not adopted. In this instance, it is not clear what that would be, since the SEC has recently proposed, but not yet adopted, several other rules that might fundamentally alter the landscape of exchange pricing, competition across exchanges and brokers, and exchange pricing structures. Many of these other proposed rules (at least ostensibly) appear to have been motivated by a desire to encourage competition across brokers, and the SEC appears to believe these other rules may have a positive impact on competition.

117. The discussion in the Proposing Release appears to evaluate the Proposed Rule against a baseline of the status quo regime in place today. Should the SEC adopt some or all of these other rules, such a baseline would no longer be meaningful or appropriate.

118. For example, in December 2022, the SEC proposed to reduce the cap on exchange take fees from 30mils to 10mils. If this rule is adopted, it will force the exchanges to restructure their fee schedules in a way that would dramatically reduce the ability of exchanges to compete for liquidity using liquidity rebates and would leave much less room for them to create incentives using volume-based pricing. The same proposal would also alter the minimum tick size for the most liquid stocks, and this might also fundamentally alter the equilibrium fee structures the exchanges choose to implement, in ways that are difficult to predict. To the extent the SEC continues to be concerned that volume-based pricing may have adverse effects on competition, despite a lack of support for this concern, the proposed restructuring of access fees and tick sizes could have huge implications for the analysis of the current Proposed Rule.

119. As another example, consider the SEC's proposed best execution rules that are still in the process of being considered. These would place significant new requirements on brokers to gather and evaluate data to assess execution quality at various venues. The SEC claims one of the potential benefits of prohibiting volume-based pricing is a reduction in conflicts of interest that might induce brokers to route customer orders in a way that is not fully in the customer's best interest. In other words, the SEC appears to be assuming that the existing best execution regime is not sufficient to resolve that conflict. Again, the SEC has not presented any evidence supporting that conclusion. But assuming it believes that to be an important consideration, then one might expect the SEC's proposed best execution rules to address that conflict.

120. As a third example, the SEC has proposed a rule that would require exchanges to determine the amounts of all fees and rebates at the time of execution.¹³¹ The SEC's stated purpose for the proposed rule is to address concerns that market participants might not be able to evaluate best execution and order routing because volume-based fees and rebates are based on volume over a given month and therefore calculated at month end. It seems that the adoption of this rule would also address the concern raised in this Proposing Release by making it easier for market participants to evaluate pass-through and potential conflicts of interest in routing.

121. As a fourth example, the SEC's outstanding proposal to expand reporting of execution quality statistics under Rule 605 to routing brokers was presumably designed to enhance competition across brokers as they compete for customers. Inasmuch as the current Proposed Rule is also motivated in part by concerns that the current exchange fee structures may be harmful to competition across brokers, the appropriate baseline for considering the impact of the current Proposed Rule depends on whether the SEC adopts the proposed amendments to Rule 605. To reiterate, the economic analysis in the Proposing Release does not provide evidence that there is cause for concern that competition across brokers for customers is not robust. But if the SEC nevertheless believes that competition across brokers can be enhanced, it has already proposed a rule that would move in that direction. To the extent that the amendments to Rule 605 enhance competition across brokers, there is that much less potential for the current Proposed Rule to have any benefits.

122. The SEC has also proposed new rules that would fundamentally change the way retail order flow is routed and executed, which would involve price-improvement auctions hosted by exchanges that would occur at fee levels prescribed by the SEC. Again, if this rule is adopted, it could fundamentally alter the nature of competition across and between trading venues and brokers, in ways that may be difficult to predict.

123. In summary, the SEC has proposed a plethora of new rules, any one of which could significantly alter the nature of competition and change the appropriate baseline against which the effects of prohibiting volume-based pricing should be evaluated.

¹³¹ Securities and Exchange Commission, "Regulation NMS: Minimum Pricing Increments, Access Fees, and Transparency of Better Priced Orders."

D. The economic analysis fails to identify meaningful benefits.

124. The SEC has not identified benefits of the Proposed Rule that are meaningful or reasonably likely to occur. The first category of “benefits” identified in the benefits section of the Proposing Release are not general benefits of the Proposed Rule but decreases in trading costs to one group of members that would be offset by increases in costs to another group. In other words, the Proposing Release is describing a redistribution, or wealth transfer, across different market participants. As explained above, when evaluating whether the aggregate benefits of a rule are sufficiently large to justify the costs, economists generally evaluate increases in total welfare, rather than redistributions of welfare.¹³² Thus, if the Proposed Rule has purely redistributive effects, those would not enter into such an economic evaluation.

125. The Proposing Release also cites as a potential benefit of the Proposed Rule the idea that eliminating volume-based pricing can encourage competition among brokers by improving the profitability and competitiveness of smaller brokers, increasing the total number of brokers, and lowering barriers to entry. However, for reasons described above, this appears to ignore that smaller brokers are likely to be indirect beneficiaries of volume-based pricing, so prohibiting it may have the opposite effects from what the SEC is hypothesizing. Thus, it may be more appropriate to view this as a cost rather than a benefit of the Proposed Rule.

126. Thus, most of what the SEC characterizes as benefits are not benefits at all, or only accrue as “benefits” to the recipient of a wealth redistribution. This leaves as the sole remaining “benefit” of the rule the idea that the Proposed Rule might help improve execution quality by reducing conflicts of interest. Given that (1) the Proposing Release provides no evidence or analysis supporting a conclusion that these conflicts are causing any harm in the current regime, (2) the SEC and FINRA already have in place a robust regime for disclosing and managing these conflicts, and (3) the SEC has already proposed to strengthen the current best execution regime, there is little reason to believe these benefits are likely to be significant. Notwithstanding, the

¹³² See, e.g., Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization*, 4th ed. (Pearson Education Limited, 2015), p. 95 (“One common measure of welfare from a market is the sum of consumer surplus and producer surplus. This measure of welfare is the value that consumers and producers would be willing to pay to purchase the equilibrium quantity of output at the equilibrium price.... [T]his measure of welfare is maximized at the competitive equilibrium.”), p. 659 (“The view that the guiding principle of the antitrust laws should be efficiency, rather than the taking of resources from one group and granting them to another, has gained increasing acceptance among legal and academic scholars.”).

SEC has made no attempt to quantify any potential benefits and weigh them against the costs identified.

127. In summary, the economic analysis in the Proposing Release does not justify a decision to adopt (or even to propose) the Proposed Rule. It provides no evidence a rule is needed, and provides no compelling narrative, let alone analysis of evidence, that the rule is likely have any significant benefits to the market as a whole. It ignores widely accepted views on the pro-competitive effects of volume-based pricing, including mixed bundling. The economic analysis does provide thoughtful discussion on possible consequences of the rule, but these suggest the Proposed Rule may be harmful to market liquidity, transaction costs, market efficiency, and capital formation.

E. The economic analysis does not provide any evidence that the Proposed Rule would increase competition between exchanges.

128. While the Proposing Release raises concerns about competition between exchanges, and a section is dedicated to describing the hypothetical impacts of the Proposed Rule on order flow concentration, the analysis in that section does not provide any evidence that the Proposed Rule would increase competition between exchanges. The analysis is entirely hypothetical and untethered from what might happen if the Proposed Rule were adopted. The results appear to be marginal. And the analysis is also incomplete: it only considers market shares of exchanges, rather than the complete market for equity trading venues, and it fails to consider any other relevant economic measures of competition such as concentration or pricing.

129. In its preamble to the analysis, the SEC admits that it cannot predict the outcome of the Proposed Rule and so will instead present “a variety of hypothetical changes”:

The extent to which the different order flows become more or less dispersed under the proposed prohibition is uncertain as it depends on the changes of a multitude of factors and their interactions which are infeasible for the Commission to reliably forecast.... In light of these difficulties, rather than providing a single point estimate, the following analysis will present expected

effects on the exchanges that a variety of hypothetical changes in order flow concentration are likely to have.¹³³

Thus, the SEC presents no rationale for why any of the scenarios are relevant or whether they are likely, probable, or even desirable.

130. The analysis is also based on assumptions that defy economic logic. First, the scenarios assume that brokers will change their routing concentration, either towards routing to every exchange on a pro-rata basis by market share, or away from it. The SEC provides no rationale for why the Proposed Rule would incentivize brokers to do that, or more importantly, why it would be economically desirable for them to do so. Second, the analysis also assumes away one of the most likely effects of the Proposed Rule, namely the potential migration of volume off-exchange.¹³⁴

131. Nevertheless, even taking the analysis as given, the results do not suggest a sizable effect. The SEC postulates that the most likely outcome of the Proposed Rule would be for the concentration of agency-related flow to decrease and the concentration of principal flow to increase.¹³⁵ Under that hypothetical scenario, the SEC finds a potentially small effect on the distribution of venues by market share. Per the SEC's caveated characterization, "a reasonable expectation for the likely effect of the proposed rule would be to result in a marginally more even distribution of market share across stock exchanges, which may be representative of a more competitive market."¹³⁶

132. Crucially, the analysis cannot speak to whether its hypothetical scenarios might increase competition or benefit investors. As explained above, the market for trading venues benefits from liquidity externalities, and this analysis does not address the impact of changing concentration on those externalities. The analysis only considers the market share of exchanges, rather than all trading venues, including ATs and off-exchange market makers, which compete for order flow. Finally, given the level of competition described in Section II.A. above, even

¹³³ Proposing Release, p. 146.

¹³⁴ "Implicit in the analysis is the assumption that the various exchange members execute the same trading volume on-exchange as they did in January 2023 baseline." Proposing Release, p. 146.

¹³⁵ "The Commission expects that the proposed prohibition for volume-based exchange transaction pricing on agency-related order flow would be likely to increase the dispersion of agency flow and increase the concentration of principal order flow across exchanges." Proposing Release, p.145.

¹³⁶ Proposing Release, p. 151.

assuming that the Proposed Rule created a “marginally more even distribution of market share across stock exchanges” (which is unclear), there is no evidence that this would yield a meaningful effect on competition. Beyond its hypothetical market share analysis, the Proposing Release contains no analysis of any other economic measures of competition, such as the pricing for equity trading services. In other words, the analysis does not support a conclusion that the rule is needed or would generate significant benefits to competition.