SECURITIES AND EXCHANGE COMMISSION

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Regulation NMS: Minimum Pricing Increments, Access Fees, and Transparency of Better Priced Orders

AGENCY: Securities and Exchange Commission.

ACTION: Final rule.

SUMMARY: The Securities and Exchange Commission ("Commission" or "SEC") is adopting amendments to certain rules of Regulation National Market System ("Regulation NMS") under the Securities Exchange Act of 1934, as amended ("Exchange Act") to amend the minimum pricing increments for the quoting of certain NMS stocks, reduce the access fee caps, and enhance the transparency of better priced orders.

DATES: *Effective Date*: [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. *Compliance dates*: See section V., titled "Compliance Dates," for further information on transitioning to the final rules.

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SUPPLEMENTARY INFORMATION: The Commission is adopting amendments to the following rules under Regulation NMS:

Commission Reference	CFR Citation (17 CFR)
Rule 600(b)(69)	§ 242.600(b)(69)
Rule 600(b)(89)	§ 242.600(b)(89)
Rule 600(b)(93)	§ 242.600(b)(93)
Rule 603	§ 242.603
Rule 610	§ 242.610
Rule 612	§ 242.612

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I. Introduction

Consistent with Congress's directive almost 50 years ago to facilitate the establishment of a national market system,[1] the Commission is amending certain of its rules to respond to market developments since those rules were adopted, so that those rules continue to benefit investors and the markets. Specifically, the Commission is taking the following actions to continue to fulfill Congress's directive and advance the objectives of investor protection and the maintenance of fair and orderly markets:

- Reduce Transaction Costs for Investors by Reducing Minimum Pricing Increments. The amendments will relax existing restrictions on market-wide minimum pricing increments ("tick sizes"), thus reducing transaction costs for investors and relaxing a constraint on price discovery for certain stocks.

  The reduced tick size will benefit investors and market participants by: (i) allowing stocks to be priced more efficiently and competitively, therefore lowering costs for investors to trade in those stocks; and (ii) improving liquidity, competition, and price efficiency in the markets.

- Improve Market Quality for Investors by Reducing Access Fee Caps and Increasing Transparency. The amendments will reduce the maximum fees that trading centers (e.g., securities exchanges) are allowed to charge investors for execution against protected quotations ("access fee caps"). The amendments will also address the lack of transparency around the cost of a transaction at the time of a trade execution by requiring exchange fees and rebates to be determinable at the time of the execution.

  The amendments will benefit investors and market participants by: (i) providing for access fee caps that accommodate the change in tick sizes; (ii) providing quotations that are more accurate and reflective of market forces; (iii) mitigating potential conflicts of interest between broker-dealers and their customers, where a broker-dealer is incentivized to route to the exchange offering the most favorable fees or rebates, which can lead to potentially worse execution quality for customers; (iv) reducing the complexity associated with the fees and rebates models; and (v) increasing the transparency of transaction fees and rebates.

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[1] See PL 94-29 (S.249), June 4, 1975, Securities Acts Amendments of 1975 ("1975 Amendments"). See also 15 U.S.C. 78k-1.

- Improve Transparency to Investors about Better Priced Orders. The amendments will increase price transparency by accelerating the implementation of previously adopted definitions of "round lot" and "odd-lot information" and by adding a data element for the best odd-lot orders to buy and sell ("BOLO") to the definition of "odd-lot information."

  These amendments will improve information available to investors and other market participants about better priced orders in smaller sizes that are available in the market.

In 1975, Congress explicitly granted the Commission "broad authority to oversee the implementation, operation, and regulation of the national market system" and the "clear responsibility to assure that the system develops and operates in accordance with Congressionally determined goals and objectives."[2] The 1975 Amendments and section 11A of the Exchange Act set forth Congress's findings regarding the nation's securities markets and direct the Commission to facilitate the establishment of a national market system in accordance with specified Congressional findings and objectives.[3]

Since 1975, the Commission has regulated the national market system, adhering to the objectives of efficient, competitive, fair, and orderly markets that are in the public interest and protect investors, which are essential to meeting the investment needs of the public and reducing

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2 Senate Report on Securities Act Amendments of 1975, S. Rep. No. 94-75 at 8-9.

3 In particular, Congress found that it is in the public interest and appropriate for the protection of investors and maintenance of fair and orderly markets to assure five objectives: (1) economically efficient execution of transactions; (2) fair competition among brokers and dealers and among exchange markets, and between markets other than exchange markets; (3) the availability to brokers, dealers and investors of information with respect to quotations for and transactions in securities; (4) the practicability of brokers executing investors' orders in the best market; and (5) an opportunity, consistent with items (1) and (4), for investors' orders to be executed without the participation of a dealer. See 15 U.S.C. 78k-1(a)(1)(C). Congress also found that new data processing and communications techniques could create the opportunity for more efficient and effective market operations, and that "[t]he linking of all markets for qualified securities through communication and data processing facilities will foster efficiency, enhance competition, increase the information available to brokers, dealers, and investors, facilitate the offsetting of investors' orders and contribute to the best execution of such orders." See 15 U.S.C. 78k-1(a)(1)(B), (D).

the cost of capital for listed companies.[4] The national market system is premised on promoting fair competition among markets, while at the same time assuring that all of these markets are linked together, through facilities and rules, in a unified system that promotes interaction among the orders of buyers and sellers in a particular NMS stock.[5]

In 2005, the Commission adopted Regulation NMS to modernize and strengthen the regulatory structure of U.S. equity markets, including requirements pursuant to which quotations and orders for NMS stocks, and the markets on which they trade, can compete. These requirements support the public interest and the protection of investors and help to ensure fair and orderly markets for the execution of orders in NMS stocks. Among other things, Regulation NMS provides explicit requirements for the tick sizes of quotations and orders,[6] the means for market participants to access quotations in the national market system, including a cap on the highest permitted level of fees a trading center may charge for access to the best quotations of a

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4 See Securities Exchange Act Release No. 51808 (June 9, 2005), 70 FR 37496, 37497 (June 29, 2005) ("Regulation NMS Adopting Release"). In the nearly fifty years since the enactment of section 11A, the Commission has monitored the national market system and its operation and has periodically reviewed certain of its rules to address issues that have arisen in the markets with the goal of ensuring that the regulatory framework continues to fulfill the goals of section 11A. In each such case, the Commission has been guided by the objectives embodied in section 11A. The Commission also formed the Equity Market Structure Advisory Committee ("EMSAC") in 2015 to provide diverse perspectives on the structure and operations of the U.S. equities markets, as well as advice and recommendations on matters related to equity market structure. The archives of these meetings are available at https://www.sec.gov/spotlight/emsac/emsac-archives.htm ("EMSAC Archives").

5 See Regulation NMS Adopting Release, supra note 4, at 37498. "NMS stock" is defined under Regulation NMS as any NMS security other than an option. 17 CFR 242.600(b)(65). An "NMS security" is defined as any security or class of securities for which transaction reports are collected, processed, and made available pursuant to an effective transaction reporting plan, or an effective national market system plan for reporting transactions in listed options. 17 CFR 242.600(b)(64).

6 See Rule 612 of Regulation NMS; 17 CFR 242.612.

trading center,[7] and how information about quotations and trades is made widely available to investors, among others.[8]

Nearly two decades later, the technology and economics of trading have evolved significantly. Transaction volume in listed equities doubled in the last five years and tripled in the last seventeen.[9] Electronic trading now dominates equity markets, with latency measured in microseconds. These changes call for improvements to assure an efficient and transparent price discovery process, in order to continue to fulfill Congress's directive and advance the objectives of investor protection and the maintenance of fair and orderly markets. However, some parts of Regulation NMS have not been revised since their 2005 adoption. Thus, the Commission is adopting the below described amendments to certain rules under Regulation NMS.[10] The following subsections provide an overview of the amendments and the rationales for each.[11]

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7 See Rule 610 of Regulation NMS; 17 CFR 242.610.

8 See Rules 601, 602, and 603 of Regulation NMS; 17 CFR 242.601, 17 CFR 242.602, 17 CFR 242.603.

9 See Cboe, "Historical Market Volume Data," available at https://www.cboe.com/us/equities/market_statistics/historical_market_volume/.

10 The Commission has amended several aspects of Regulation NMS to address and reflect changes in the markets since its adoption. For example, in 2018, the Commission adopted new order handling disclosure requirements in Rule 606 in response to changes in equity market structure and order handling and routing practices. See Securities Exchange Act Release No. 84528 (Nov. 2, 2018), 83 FR 58338 (Nov. 19, 2018). In 2020, the Commission adopted rules to update the national market system for the collection, consolidation, and dissemination of equity market data in the national market system to keep pace with technological developments concerning the use of market data. See Securities Exchange Act Release No. 90610 (Dec. 9, 2020), 86 FR 18596 (Apr. 9, 2021) ("MDI Adopting Release"). More recently, responding to changes in market conditions caused by technological advancements and the increased participation of individual investors in the equity markets, the Commission adopted amendments to Rule 605 under Regulation NMS to update the disclosure of order execution quality statistics reports. See Securities Exchange Act Release No. 99679 (Mar. 6, 2024), 89 FR 26428, 26429 (Apr. 15, 2024) ("Rule 605 Amendments") (adopting amendments to rule 605 under Regulation NMS to update reports on execution quality).

11 See generally Securities Exchange Act Release No. 96494 (Dec. 14, 2022), 87 FR 80266 (Dec. 29, 2022) ("Proposing Release" or "Regulation NMS Proposal").

A. Rule 612 Minimum Pricing Increments

1. Background

One way that investors can buy or sell a stock is through the use of limit orders, which are a type of order that specifies the price ("limit price") at which the investor is willing to buy or sell a security.[12] Limit orders serve a critical market function by helping to set prices at which market participants are willing to trade, revealing the supply and demand for a security, and providing liquidity to the market. As such, limit orders play a key role in price discovery and allow investors to participate in the price-setting process.[13]

Recognizing the value of limit orders, the Commission adopted Rule 612 under Regulation NMS, which requires that the prices of quotations and orders in the national market system be reflected in a specified minimum pricing increment, also known as the "tick size." Rule 612 required, for quotations and orders of NMS stocks priced at or greater than $1.00 per

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12 Whether a limit order can be executed immediately depends on the limit price in relation to the current market price. For example, a buy order with a limit price of $10.00 means the investor would like to buy as soon as possible, but only when the current market price is at $10.00 or less. By contrast, a "market order" is a type of order by which the investor specifies that it wishes to buy or sell a security at the current market price, regardless of what the market price is. See generally, Securities Exchange Act Release No. 96495 (Dec. 14, 2022), 88 FR 128, 132-33 (Jan. 3, 2023); Regulation NMS Adopting Release, supra note 4, at 37505 n.53.

13 Limit orders may be "marketable" meaning that its specified price allows an immediate execution because it matches a contra-side order, or they may be "non-marketable" meaning that its specified price does not allow for an immediate execution and therefore it must wait until a contra-side order comes in to trade with it. Non-marketable limit orders that are submitted to an exchange are placed on the order book and, if displayable, the price and size will be displayed in the national market system if it is the best priced order to buy or sell for such exchange. The Commission has recognized displayed limit orders as "a critically important element of efficient price discovery." See Regulation NMS Adopting Release, supra note 4, at 37517.

share, the minimum pricing increment to be $0.01.[14] As a result, subject to certain exceptions,[15] the quotations and orders of such NMS stocks are priced in penny increments: $10.00, $10.01, $10.02, for example.

The Commission adopted Rule 612 and minimum pricing increments to address the concern that a market participant could gain priority over existing limit orders by posting an economically insignificant price improvement.[16] For example, consider a market participant that posts a limit order to buy an NMS stock at $10.00 per share. Without minimum pricing increments, a second market participant could "step ahead" (also known as "pennying") of the first market participant by posting a bid to buy at a price that is higher by an infinitesimally small amount, such as $10.000001.[17] This behavior disincentivizes market participants from posting a limit order in the first place because another market participant could always gain priority over that first price by posting a limit order that is better by an economically insignificant amount.[18] This may lead to a decline in limit orders, harm liquidity, and make it more costly to trade.[19]

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14 See preexisting 17 CFR 242.612(a). For quotations and orders of NMS stocks priced less than $1.00 per share, Rule 612 required the minimum pricing increment to be $0.0001. See preexisting 17 CFR 242.612(b). However, most exchanges require stocks listed on their exchanges to maintain a price greater than $1.00 per share, and consequently $0.01 is the prevailing tick size for most quotes and orders for NMS stocks. See infra section VII.C.1.a.

15 See infra section VII.C.1.a. (discussing retail liquidity programs).

16 When Rule 612 was adopted, the Commission stated that "[g]reater use of limit orders will increase price discovery and market depth and liquidity" and that "if orders lose execution priority because competing orders step ahead for an economically insignificant amount, liquidity could diminish." See Regulation NMS Adopting Release, supra note 4, at 37505, 37553. The Commission was concerned that stepping ahead of displayed limit orders by insignificant amounts would deter the submission and display of limit orders, which would negatively impact price discovery and market depth and liquidity. See id. at 37553. See also infra section VII.A (discussing the importance of minimum pricing increments).

17 But with the minimum pricing increment of a penny, that same market participant would be required to post a bid of $10.01 instead.

18 See infra sections VII.A, VII.B.2, and VII.D.1.

19 See infra sections VII.A, VII.B.2, and VII.D.1.b.i for additional analysis of pennying.

This hypothetical scenario illustrates the need for a minimum pricing increment that is not too small.

Too big of a minimum pricing increment is also problematic since it would reduce the quality of price discovery by precluding price competition for providing liquidity.[20] More specifically, too large a tick size can increase transaction costs for investors by artificially widening the "bid-ask spread" – the difference between the bid (highest price a buyer is willing to pay) and the ask (the lowest price a seller is willing to accept) prices.[21] For example, consider a hypothetical scenario where a liquidity provider is willing to bid $10.121 to buy a stock and offer $10.124 to sell the stock. If the tick size were $0.005, the resulting bid and offer from this liquidity provider would be $10.120 and $10.125, respectively, with a spread of $0.005. If the tick size were $0.01, the corresponding bid and offer would be $10.120 and $10.130, with a spread of $0.01.[22] In other words, but for the requirement under Rule 612 that sets the tick size to be $0.01 for quotes and orders in NMS stocks priced at or above $1.00, a smaller tick size would have narrowed spreads in some instances and allowed prices to better reflect the underlying economics for certain NMS stocks. As explained below, up to 74.3% of the share volume transacted in NMS stocks in 2023 may have bid-ask spreads that are constrained by the current minimum pricing increments.[23] These widened bid-ask spreads increase transaction costs for

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20 See infra section VII.B.2.

21 See infra section VII.B.2; see also 17 CFR 242.600(b)(16).

22 See infra section VII.B.2 (providing a similar example showing how a minimum pricing increment could double the width of a bid-ask spread).

23 See infra section VII.C.1.b (discussing percentage of share volume likely to be tick-constrained). See also infra section VII.B.2 (discussing the definition of "tick-constrained").

investors.[24] Conversely, a smaller tick size that allows for narrower bid-ask spreads would benefit investors by reducing transaction costs.[25]

The minimum pricing increments in Rule 612 were adopted in 2005, when the Commission adopted Regulation NMS, and it was an adjustment in a long series of adjustments to the minimum pricing increments over time. For many decades, the U.S. equity markets used fractions of a dollar as minimum pricing increments (e.g., 1/8, 1/16, and 1/32 of a dollar).[26] Prior to 1997, the minimum pricing increment on the New York Stock Exchange LLC ("NYSE") for stocks above $1.00 per share was 1/8 of a dollar (or 12.5 cents).[27] In 1997, NYSE and the Nasdaq Stock Market LLC ("Nasdaq") revised their rules to use the minimum pricing increment of 1/16 of a dollar (6.25 cents).[28] In January 2000, the Commission mandated decimal pricing (i.e., moving from fractional increments to penny increments) in certain securities,[29] and by April 2001, the market had fully converted to decimal pricing.[30]

Up to this point, minimum pricing increments for NMS stocks were set by the individual trading venues. But in 2004, as part of Regulation NMS and pursuant to the authority under the

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24 See infra section VII.B.2.

25 See infra section VII.B.2.

26 See Staff Report to Congress on Decimalization, Commission (July 2012) ("Staff Decimalization Report"), available at https://www.sec.gov/files/decimalization-072012.pdf, at 4. Staff reports, Investor Bulletins, and other staff documents (included those cited herein) represent the views of Commission staff and are not a rule, regulation, or statement of the Commission. The Commission has neither approved nor disapproved the content of these staff documents, and, like all staff documents, they have no legal force or effect, do not alter or amend the applicable law, and create no new or additional obligations for any person.

27 See Self-Regulatory Organizations; New York Stock Exchange, Inc.; Order Granting Approval to Proposed Rule Change Relating to Trading Differentials for Equity Securities, 62 FR 42847, 42848 n.5 (Aug. 8, 1997). See also Division of Market Regulation, Market 2000: An Examination of Current Equity Market Developments (1994), available at https://www.sec.gov/divisions/marketreg/market2000.pdf, at 37-38, fn. 43 (describing NYSE's tick size of 1/8 of a dollar in 1994).

28 See Staff Decimalization Report, supra note 26, at 4-5.

29 See Securities Exchange Act Release No. 42360 (Jan. 28, 2000), 65 FR 5003 (Feb. 2, 2000).

30 See Staff Decimalization Report, supra note 26, at 5-6.

1975 Amendments, the Commission proposed Rule 612 to implement market-wide uniform minimum pricing increments for quoting in NMS stocks.[31] The Commission stated that, while the benefits of decimal pricing had justified the costs, there was a potential for costs to investors and the markets to surpass the benefits if the minimum pricing increment decreased beyond a certain level, and the proposed rule was designed to address the scenario where market participants attempt to step ahead of competing limit orders at the smallest economic increment possible.[32] Thus, the Commission adopted Rule 612 in 2005, which established the minimum pricing increments of $0.01 for quotations and orders of NMS stocks priced at, or greater than, $1.00 per share, and $0.0001 for quotations and orders of NMS stocks priced under $1.00 per share. The Commission stated that, at the time, it did not believe that the potential benefits of marginally better prices offered by allowing sub-penny quoting in securities were likely to justify the costs of permitting such quotes.[33]

When the Commission adopted Rule 612 in 2005, it acknowledged that the markets could evolve over time and shift the balance of the costs and benefits of the adopted tick size.[34] Two decades later, the market has evolved considerably, and amendments to Rule 612 are necessary to continue to further the objectives of the Exchange Act. Data analysis shows that stocks with

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31 See Securities Exchange Act Release No. 49325 (Feb. 26, 2004), 69 FR 11126, 11171 (Mar. 9, 2004) ("2004 Regulation NMS Proposing Release") ("the Commission is proposing a rule that would prohibit every national securities exchange, national securities association, ATS (including ECNs), vendor, broker or dealer from ranking, displaying, or accepting from any person a bid or offer, an order, or an indication of interest in any NMS stock in an increment less than $0.01.").

32 See Regulation NMS Adopting Release, supra note 4, at 37551-52 (citing 2004 Regulation NMS Proposing Release at 11165).

33 See Regulation NMS Adopting Release, supra note 4, at 37553 ("Even assuming that quoting in sub-penny increments would reduce spreads, the Commission continues to believe, on balance, that the costs of sub-penny quoting are not justified by the benefits.").

34 Id. ("Nevertheless, the Commission acknowledges the possibility that the balance of costs and benefits could shift in a limited number of cases or as the markets continue to evolve.").

sufficiently narrow bid-ask spreads would trade better, namely it would be easier and less costly for investors to transact, if they were allowed to quote at increments smaller than one penny.[35] Indeed, for these stocks, the risks of "stepping ahead" are lowered while the benefits of greater price competition from relaxing the "tick constraint" are greater.[36]

2. Proposed and Adopted Amendments

Accordingly, the Commission proposed amendments to Rule 612 to introduce three minimum pricing increments that were less than $0.01 (i.e., $0.005, $0.002, $0.001) for quotes and orders priced $1.00 or more for certain NMS stocks based upon each stock's time weighted average quoted spread ("TWAQS").[37] The proposed amendments would have assigned sub-penny minimum pricing increments to any NMS stock that had a TWAQS of $0.04 or less. This proposed amendment was designed to address the issues related to tick-constrained stocks described above that have arisen since 2005. The Commission also proposed to impose these minimum pricing increments for trades, subject to certain exceptions.

As explained below, in response to commenters, the Commission is adopting modified amendments to Rule 612 to introduce one minimum pricing increment that is less than $0.01, i.e., $0.005, for quotes and orders priced $1.00 or more for NMS stocks that have a TWAQS of $0.015 or less.[38] The Commission is not adopting a minimum pricing increment for trades.[39]

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35 See infra section VII.D.1.

36 See infra sections VII.B.2 and VII.D.1.b.

37 See Proposing Release, supra note 11, at 80280.

38 See infra section III.C.

39 See infra section III.D.

B. Rule 610 Fees for Access to Quotations and Transparency of Fees

1. Background

Trading centers[40] can choose to charge an access fee, or pay a rebate, to the participants – liquidity providers (market participants with orders resting at the trading center) and liquidity takers (market participants who submit incoming orders to execute against orders resting at the trading center) – who trade at their venue. As discussed in section VII.C.2.b, the predominant exchange fee structure is maker-taker, in which an exchange charges a fee to liquidity takers and pays a rebate to liquidity providers, and the rebate is typically funded through the access fee.[41]

As adopted in 2005, Rule 610(c) set the access fee cap for protected quotations[42] priced at $1 or more at 30 cents per 100 shares ("30 mils" per share) for NMS stocks. Rule 610(c) also applies to any other quotation of a trading center that is the best bid or offer of an exchange or association.[43] The access fee cap was based, in part, upon the prevailing fees that were charged by certain trading centers at that time.[44] For NMS stocks priced below $1, the fee cap was set at 0.3% of the quotation price.[45] Rule 610 was adopted at the same time as Rule 611, the Order

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40 17 CFR 242.600(b)(106) (providing a definition of the term "trading center"). This discussion focuses on exchange fees because, currently, exchanges are the only trading centers that have quotations that are subject to the access fee caps under Rule 610(c). See infra note 367.

41 See also infra sections VII.B.3 and VII.C.2.c, Table 5 and Table 6 (showing the predominance of both dollar and share exchange trading volume occurs on maker-taker venues).

42 17 CFR 242.610(c). A protected quotation is defined in Rule 600(b)(82) as "a protected bid or protected offer." 17 CFR 242.600(b)(82). A protected bid or protected offer is defined as "a quotation in an NMS stock that: (i) Is displayed by an automated trading center; (ii) Is disseminated pursuant to an effective national market system plan; and (iii) Is an automated quotation that is the best bid or best offer of a national securities exchange, or the best bid or best offer of a national securities association." 17 CFR 242.600(b)(81).

43 For purposes of this discussion, references to protected quotations under Rule 610(c) also include manual quotations that are the best bid or best offer of an exchange or association.

44 See Regulation NMS Adopting Release, supra note 4, at 37545.

45 See Regulation NMS Adopting Release, supra note 4, at 37544 n.406.

Protection Rule, which established intermarket protection against trade-throughs[46] for all NMS stocks. Rule 610(c) was designed to preclude trading centers that posted protected quotations from raising their fees in an attempt to take improper advantage of the trade-through protections adopted under Rule 611.[47] The Commission designed the access fee caps to preserve the benefits of both the strengthened price protection under Rule 611 and the more efficient linkages among trading centers that were developed under Regulation NMS to access protected quotations because the benefits could be compromised if substantial fees were charged.[48]

Since an access fee that is too high when compared to the tick size can create pricing distortions, the access fee caps need to be adjusted in conjunction with the reduction in tick size to prevent such distortions.[49] In addition, as discussed below, many exchanges charge the maximum fee allowed to access protected quotes, and primarily use those fees to pay rebates to market participants that provide liquidity.[50] This practice raises a number of concerns and may interfere with section 11A's objectives of ensuring the fairness and usefulness of quotation information.[51]

First, the actual prices, inclusive of fees and rebates, for investors and other market participants to trade a stock are not fully transparent. In general, the higher the permitted level of

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46 A trade-through occurs when a trading center executes an order at a price that is inferior to the price of a protected quotation that is displayed by another trading center. See 17 CFR 242.600(b)(105) for the definition of trade-through under Regulation NMS.

47 See Regulation NMS Adopting Release, supra note 4, at 37544 and 37595.

48 See Regulation NMS Adopting Release, supra note 4, at 37544.

49 See infra sections IV.D.1 and VII.D.2.a. See also Proposing Release, supra note 11, at 80348 (stating "the access fee cap should not be greater than ½ of the tick size in order to preserve coherence between net and nominal price rankings of trading venues.").

50 See infra sections VII.B.3 and VII.C.2.

51 See infra sections IV.D.1 and VII.B.3. See also Regulation NMS Adopting Release, supra note 4, at 37545 ("For quotations to be fair and useful, there must be some limit on the extent to which the true price for those who access quotations can vary from the displayed price.").

access fees, the higher the rebates, and the greater the potential discrepancy between displayed quoted prices on the one hand, and actual prices on the other.[52]

Furthermore, exchanges' use of fees and rebates creates a potential conflict of interest between broker-dealers and their customers with respect to broker-dealer order routing, by providing incentives for a broker-dealer to route customer orders to certain exchanges to receive higher rebates or avoid higher fees based on their own economic interest.[53] This potential conflict of interest is exacerbated if broker-dealers do not fully pass on the fees and rebate to their customers, since rebate-seeking by broker-dealers may come at the cost of execution quality of customers.[54] In addition, exchanges use complex fee schedules. Generally, the higher the access fee cap, the wider the range of possible fees and rebates, which results in more complex pricing schedules. Such complexity makes it more costly for market participants to design and implement order execution strategies.

Finally, exchanges' fee and rebate schedules are typically calculated at month's end, which requires market participants to make trading decisions without the ability to determine their full trading costs at the time of execution.[55] In turn, this lack of transparency impedes a market participant's ability to evaluate fully where to send its orders because the market participant cannot calculate the fees and rebates that will apply to the order contemporaneous with execution.[56] Concerns with such lack of price transparency are exacerbated when various

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52 See infra sections IV.B.2, VII.D.2, and VII.E.1. In certain cases, the disparity between market quotations and actual transaction costs may be substantial. See, e.g., Proposing Release, supra note 11, at 80328.

53 See infra sections IV.B.2, IV.D and VII.D.3.

54 See text accompanying infra note 1518.

55 See infra sections IV.E, VII.C.2, and VII.D.3.

56 See infra sections IV.E, VII.C.2, and VII.D.3.

exchanges have different fee schedules, as it is difficult for market participants to compare net prices across markets.

2. Proposed and Adopted Amendments

Accordingly, the Commission proposed to amend Rule 610 in two ways. First, to accommodate the proposed smaller minimum pricing increments under proposed Rule 612, as well as to address the distortions that have developed under the access fee caps, the Commission proposed to reduce Rule 610(c)'s 30 mil cap for executions against protected quotations priced $1.00 or more as follows: a $0.001 (or 10 mils) access fee cap for NMS stocks that would have been assigned a minimum pricing increment larger than $0.001; and a $0.0005 (or 5 mils) access fee cap for NMS stocks that would have been assigned a $0.001 minimum pricing increment. For protected quotations in NMS stocks priced under $1.00 per share, the Commission proposed to reduce the 0.3% fee cap to 0.05% of the quotation price.

As discussed in detail below, in response to comments, the Commission is adopting amendments to Rule 610(c) with modifications from the proposal. Specifically, in light of the amendments to Rule 612, the Commission is adopting only the proposed 10 mil per share access fee cap for all protected quotations priced $1.00 or more.[57] For protected quotations priced less than $1.00, the Commission is adopting an access fee cap of 0.1% of the quotation price per share.[58] As discussed in section VII.D.2.b, the adopted amendments to the access fee caps will not impede the ability of exchanges to fund their execution services.

Second, to facilitate the ability of market participants to understand and calculate the total price of transactions at the time of execution, the Commission proposed an amendment to Rule

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57 See infra section IV.D.

58 See id.

610 to add subpart (d) to require that all exchange fees charged, and rebates paid, for the execution of an order in an NMS stock be determinable at the time of execution. As discussed in detail below, the Commission is adopting Rule 610(d) as proposed.

C. Transparency of Better Priced Orders

1. Background

The widespread availability of timely information with respect to quotations for and transactions in NMS stocks ("NMS information") is critical to the ability of market participants to participate effectively in the U.S. securities markets.[59] NMS information is currently disseminated within the national market system by the exclusive plan processors ("exclusive securities information processors" or "SIPs").[60]

In 2020, the Commission adopted amendments to Regulation NMS to modernize the NMS information provided within the national market system for the benefit of market participants and to better achieve section 11A's goals of assuring "the availability to brokers, dealers, and investors of information with respect to quotations for and transactions in securities that is prompt, accurate, reliable, and fair" ("MDI Rules").[61] In light of delays in the

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59 NMS information is made widely available to investors through the national market system and "serves an essential linkage function by helping to assure that the public is aware of the best displayed prices for a stock, no matter where they may arise in the national market system." See Securities Exchange Act Release No. 61358 (Jan. 14, 2010), 75 FR 3594 (Jan. 21, 2010) ("Concept Release on Equity Market Structure") at 3600. The availability of NMS information also "enables investors to monitor the prices at which their orders are executed and assess whether their orders received best execution." Id.

60 There are three effective national market system plans that govern the collection, consolidation, processing and dissemination of quotation and transaction information for NMS stocks: the Consolidated Tape Association Plan ("CTA Plan"); the Consolidated Quotation Plan ("CQ Plan"); and the Joint Self-Regulatory Organization Plan Governing the Collection, Consolidation, and Dissemination of Quotation and Transaction Information for Nasdaq-Listed Securities Traded on Exchanges on an Unlisted Trading Privileges Basis ("UTP Plan") (together the "Equity Data Plans"). Currently, the Securities Industry Automation Corporation ("SIAC," an affiliate of the NYSE) is the exclusive SIP for the CTA and CQ Plans, and Nasdaq is the exclusive SIP for the UTP Plan. See MDI Adopting Release, supra note 10, at 18728. Each exclusive SIP is the plan processor for one of the Equity Data Plans.

61 See MDI Adopting Release, supra note 10.

implementation of the MDI Rules, the Commission is accelerating the implementation of the round lot and odd-lot information definitions adopted as part of the MDI Rules so that investors will benefit sooner from greater transparency and accessibility of better priced orders[62] and improved ability to assess the execution quality of their orders, as explained below.[63]

Until the full implementation of the MDI Rules, NMS information disseminated within the national market system by the exclusive SIPs includes, for each NMS stock, the price, size, and exchange of each last sale, each exchange's current highest bid and lowest offer and the shares available at those prices (the best bid and best offer or "BBO"), the national best bid and national best offer ("NBBO"), odd-lot[64] transaction information, and certain regulatory and administrative data ("SIP data").[65] Information on NMS stock quotations is provided in round lots, and, until the round lot definition adopted in the MDI Rules is implemented, round lots are defined in rules of the exchanges.[66] For most NMS stocks, exchange rules define a round lot as

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62 "Better priced orders" refers to orders that are priced superior to the national best bid and national best offer but are not included in NMS information because they consist of too few shares. See infra notes 66-68 and accompanying text. The MDI Rules' round lot and odd-lot information definitions will allow better priced orders to be included in NMS information so that market participants that subscribe to the exclusive SIP feeds (that otherwise would not be able to view these orders without purchasing exchange proprietary feeds) will be able to view and access these orders.

63 See infra sections V.C.1.a and VII.D.4.

64 Odd-lot is defined in Rule 600(b)(68) as an order for the purchase or sale of an NMS stock in an amount less than a round lot. 17 CFR 242.600(b)(68).

65 See Proposing Release, supra note 11, at 80294. Under the decentralized consolidation model established by the MDI Rules, NMS information will consist of "consolidated market data," as defined in the MDI Rules. 17 CFR 242.600(b)(24).

66 See Proposing Release, supra note 11, at 80294 n.328. A "round lot" is not defined in the Exchange Act and, prior to the MDI Rules, it was not defined in Regulation NMS. Exchange rules typically define a round lot as 100 shares, but they also allow the exchange, or the primary listing exchange for the stock, discretion to define it otherwise. See, e.g., NYSE Rule 7.5 ("A 'round lot' is 100 shares, unless specified by the primary listing market to be fewer than 100 shares.").

100 shares.[67] Market participants interested in quotation data for orders that have a size less than a round lot, i.e., odd-lots, must purchase individual exchange proprietary feeds.[68] This odd-lot order information is highly relevant to market participants, including for investors who trade small numbers of shares.

The MDI Rules expanded the NMS information that will be made available for dissemination within the national market system in order to increase transparency about better prices available in the market.[69] The Commission, in the MDI Rules, amended Regulation NMS to include a definition of "round lot" that assigns each NMS stock to a round lot size based on the stock's average closing price. The round lot definition, once implemented, will increase transparency about smaller sized orders in higher priced stocks by assigning NMS stocks priced over $250 to round lot sizes that are less than the predominant 100 shares.[70] The Commission also adopted a definition of odd-lot information as part of the MDI Rules.[71] Once implemented, information regarding the prices and sizes of odd-lot orders priced better than the NBBO will be

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67 According to NYSE Trade and Quote ("TAQ") Data, as of Nov. 28, 2023, 11 NMS stocks have a round lot size other than 100. Nine NMS stocks have a round lot size of 10 and two NMS stocks have a round lot size of one share.

68 See Proposing Release, supra note 11, at 80294; MDI Adopting Release, supra note 10, at 18599.

69 See Proposing Release, supra note 11, at 80270.

70 17 CFR 242.600(b)(93). In the MDI Adopting Release, the Commission stated that "[d]efining smaller-sized orders in higher-priced stocks as round lots, in addition to providing transparency into such quotations, ensures that these smaller-sized orders can establish the [national best bid and national best offer], receive order protection, and invoke the applicability of several other rules under Regulation NMS." See MDI Adopting Release, supra note 10, at 18613.

71 Preexisting 17 CFR 242.600(b)(69). "Odd-lot information" is defined as (1) odd-lot transactions, and (2) odd-lots at a price greater than or equal to the national best bid and less than or equal to the national best offer, aggregated at each price level at each national securities exchange and national securities association. Id.

made available within the national market system and is expected to be made widely available to investors.[72]

For the reasons explained in the MDI Adopting Release, the MDI Rules sequenced the implementation of these definitions in the later stages of the implementation schedule.[73] The implementation of the MDI Rules began with the filing of amendments to the effective national market system plan(s) as required under Rule 614(e) ("MDI Plan Amendments").[74] The Operating Committees of the CTA/CQ Plan and UTP Plan[75] filed the proposed MDI Plan Amendments on November 5, 2021,[76] which the Commission disapproved.[77] As a result, the

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72 The Commission stated that the inclusion of this odd-lot quotation information would allow market participants "to trade in a more informed and effective manner," and that "the new definition of round lot and the increased availability of better priced odd-lot information will provide investors with valuable information about the best prices available and help to facilitate more informed order routing decisions and the best execution of investor orders." See MDI Adopting Release, supra note 10, at 18602 and 18613. Unlike orders in the round lot sizes adopted pursuant to the MDI Rules, odd-lots are not "protected quotations." See 17 CFR 242.600(b)(16), (81), (82).

73 See MDI Adopting Release, supra note 10, at 18698. Pursuant to the implementation schedule of the MDI Rules, the round lot definition was set to be implemented as part of the last phase and odd-lot quotation information was set to be implemented during a "parallel operation period." See id. at 18700-01. As originally adopted, during the parallel operation period, the exclusive SIPs would have continued to disseminate the data that they currently disseminate and competing consolidators would have been permitted to offer consolidated market data products, including odd-lot information. Because the round lot definition would have been implemented during a later phase, the exclusive SIPs and competing consolidators would have collected, consolidated and disseminated NMS information based on then current exchange definitions of round lot. Id. at 18699-18701.

74 17 CFR 242.614(e). The Commission's approval of amendments to the effective national market system plan(s) filed pursuant to rule 614(e) will be the starting point for the rest of the MDI Rules implementation schedule, which includes a 180-day development period, during which competing consolidators can register with the Commission, and ends with the cessation of the operations of the exclusive SIPs and testing and implementation of the changes necessary to implement the round lot definition. See MDI Adopting Release, supra note 10, at 18699-701; Proposing Release, supra note 11, at 80295.

75 See supra note 60.

76 See Securities Exchange Act Release Nos. 93615 (Nov. 19, 2021), 86 FR 67800 (Nov. 29, 2021); 93625 (Nov. 19, 2021), 86 FR 67517 (Nov. 26, 2021); 93620 (Nov. 19, 2021), 86 FR 67541 (Nov. 26, 2021); 93618 (Nov. 19, 2021), 86 FR 67562 (Nov. 26, 2021).

77 See Securities Exchange Act Release Nos. 95848 (Sept. 21, 2022), 87 FR 58544 (Sept. 27, 2022); 95849 (Sept. 21, 2022), 87 FR 58592 (Sept. 27, 2022); 95850 (Sept. 21, 2022), 87 FR 58560 (Sept. 27, 2022); 95851 (Sept. 21, 2022), 87 FR 58613 (Sept. 27, 2022).

participants to the effective national market system plan(s) will need to develop and file new proposed amendments pursuant to Rule 608.[78]

2. Proposed and Adopted Amendments

In light of the delays in the implementation of the MDI Rules, the Commission proposed to accelerate the implementation of the round lot and odd-lot information definitions, to allow investors to benefit sooner from greater transparency and accessibility of better priced orders and improved execution quality.[79] As discussed further below, the Commission is accelerating the implementation of the round lot and odd-lot information definitions but is providing the industry with more time to make the necessary systems changes to implement these definitions than what was proposed.[80]

Additionally, the Commission proposed to amend the definition of odd-lot information to include a new data element for the best odd-lot orders available in the market, which would be

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78 On Sept. 1, 2023, the Commission ordered the exchanges and the Financial Industry Regulatory Authority, Inc. ("FINRA") to file a new single national market system plan regarding consolidated equity market data. See Securities Exchange Act Release No. 98271, 88 FR 61630 (Sept. 7, 2023). On Jan. 19, 2024, the Commission published notice of filing of a National Market System Plan for Consolidated Equity Market Data. See Securities Exchange Act Release No. 99403, 89 FR 5002 (Jan. 25, 2024). On April 23, 2024, the Commission instituted proceedings pursuant to Rule 608(b)(2)(i) of Regulation NMS to determine whether to approve or disapprove the proposed plan or to approve the proposed plan with any changes or subject to any conditions the Commission deems necessary or appropriate after considering public comment. See Securities Exchange Act Release No. 100017, 89 FR 33412 (Apr. 29, 2024). On July 11, 2024, the Commission extended the period within which to conclude proceedings regarding the proposed plan to 240 days from the date of publication of the notice. See Securities Exchange Act Release No. 100500 (Jul. 11, 2024), 89 FR 58235 (Jul. 17, 2024).

79 See Proposing Release, supra note 11, at 80299; see also infra sections V.B.2. and V.C.1. In addition, as discussed below, the Commission is amending the definition of round lot so that the frequency of round lot changes will be consistent with the frequency of minimum pricing increment changes under amended Rule 612. See infra section V.B.3.b. The Commission is not changing the calculation used to assign round lots or the round lot tiers in the round lot definition adopted in the MDI Rules.

80 See infra sections V.B.3, V.C.1, and VI.C.

made available to investors broadly. The Commission is adopting the best odd-lot order to buy and the best odd-lot order to sell as part of odd-lot information as proposed.[81]

D. Overarching Comments on the Proposing Release

The Commission received comments from a variety of market participants on the Proposing Release.[82]

Many commenters broadly supported the Regulation NMS Proposal.[83] Two commenters urged the Commission to promptly adopt the Regulation NMS Proposal.[84] One commenter urged the Commission to revise and adopt the Rule 605 Proposal as well as the Regulation NMS

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81 See infra section V.C.2.

82 The comment letters on the Proposing Release (File No. 7-30-33) are available at https://www.sec.gov/comments/s7-30-22/s73022.htm.

83 See, e.g., Letters from Mark Rogers dated Mar. 30, 2023 ("I approve of the proposed changes to Regulation NMS"); Omar Fakhro dated Mar. 28, 2023 ("I as a household investor strongly support this rule for a better and fair market for EVERYONE"); Danielle Ball dated Mar. 27, 2023 ("The proposed tick size regime, variable minimum pricing increment model, and revised round lot definition are important steps towards promoting fair and transparent pricing across trading venues."); Keith Noble dated Apr. 1, 2023; Chris Miller dated Apr. 1, 2023; Kristen Palmer dated Apr. 1, 2023; Amanda Kappes dated Apr. 1, 2023; Ian Rohel, dated Apr. 1, 2023; Riley Hume dated Apr. 1, 2023; Matt Kelleher dated Apr. 1, 2023; Keagan Wethington dated Mar. 31, 2023; J. W. Verret, Associate Professor, George Mason University Antonin Scalia Law School, dated Jan. 12, 2024 ("Verret Letter III") at 26 ("…the proposed amendments to Reg NMS rules regarding minimum pricing increments and the proposed reforms to volume/access fees both support the core principles of free market economics and will lead to a more competitive, transparent, and efficient market landscape."); Eric Budish, Paul G. McDermott Professor of Economics and Entrepreneurship, The University of Chicago Booth School of Business, dated Jan. 18, 2024 ("Budish Letter") at 1 ("… this set of rules changes – primarily, a finer tick-size for tick-constrained stocks, a lower access fee cap, and harmonization of pricing increments for on-exchange and off-exchange trading – will reduce both investors' costs and the overall complexity of U.S. equity markets."); Stephen W. Hall, Legal Director and Securities Specialist, and Brady Williams, Legal Counsel, Better Markets, Inc., dated Mar. 31, 2023 ("Better Markets Letter I") at 8-17; Joseph Saluzzi, Partner, Themis Trading LLC, dated Mar. 31, 2023 ("Themis Letter") at 2-8; John Ramsay, Chief Market Policy Officer, Investors Exchange LLC, dated Mar. 20, 2023 ("IEX Letter I"); Letter Type A, of which 22 comments were received; Letter Type C, of which 5 comments were received; Letter Type D, of which 255 comments were received; Letter Type E, of which 14 comments were received; Letter Type G, of which 652 comments were received; Letter Type H, of which 853 comments were received; Letter Type I, of which 22 comments were received; Letter Type J, of which 15 comments were received; Letter Type K, of which 22 comments were received; and Letter Type L, of which 4 comments were received; available at https://www.sec.gov/comments/s7-30-22/s73022.htm.

84 See, e.g., Letters from Tyler Gellasch, President & CEO, Healthy Markets Association, dated Mar. 31, 2023 ("Healthy Markets Letter I") at 28, 31; J. W. Verret, Associate Professor, George Mason University Antonin Scalia Law School, dated Sept. 20, 2023 ("Verret Letter I") at 1-2, 4, 5.

Proposal without delay.[85] Another commenter suggested that the Commission prioritize the adoption of the Regulation NMS Proposal[86] stating that, of the four EMS Proposals related to equity market structure, the Regulation NMS Proposal "is the least controversial and the least interdependent on the other three, and so is the easiest one for the Commission to move forward"[87] and "has garnered the most consensus and support from various market participants."[88]

Some commenters agreed that Rules 610 and 612 should be amended but recommended that the proposed amendments be modified and that the Commission consider more modest, incremental changes to minimize the possibility of unintended consequences and to enable the Commission and market participants to evaluate the impact of the changes on trading and execution quality.[89]

The issues related to the amended rules have been considered by the Commission and market participants for several years.[90] Further, the Commission has analyzed data provided by market participants and conducted its own data analysis to inform the amendments that were included in the Proposing Release and in this release.[91] The Commission has evaluated the

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85 See Healthy Markets Letter I at 28, 31.

86 See Verret Letter I at 1.

87 Verret Letter I at 1-2.

88 See Verret Letter I at 2 (stating that the Regulation NMS Proposal is supported by "a wealth of prior work by the Commission in the form of a pilot tick size study, comments submitted to the SEC regarding the transaction fee pilot, and numerous roundtables and proceedings of the SEC's Investor Advisory Committee and SEC's Equity Market Structure Advisory Committee.").

89 See, e.g., infra note 92.

90 See, e.g., EMSAC Archives, supra note 4 (Rule 610 was considered at the EMSAC), see also supra note 4 (discussing the EMSAC); infra note 362 and accompanying text for a discussion of previous considerations of Rule 610. For a discussion of previous considerations of Rule 612, see Proposing Release, supra note 11, at 80272.

91 See infra sections V.B.1; V.B.3.b.iv and VII.D.

national market system and its operation in light of changes in the market and has sought input from market participants throughout this process.[92] After considering the comments, which are discussed in context below, the Commission is adopting amendments to these rules with certain modifications from the Proposing Release.

The Commission received several comments that addressed the interaction between the different individual proposed rule amendments that made up the Regulation NMS Proposal. One commenter stated that adopting the proposed changes to the minimum pricing increments in proposed Rule 612 along with the proposed acceleration of the round lot definition and the proposed access fee caps in Rule 610 "would impact the value of providing liquidity on public markets and consequently would raise costs for investors," and urged the Commission to review how these changes would together impact liquidity.[93] The Commission has considered the impact of the amendments on liquidity and does not believe that they will raise costs for investors.[94] On the contrary, as discussed further below, the amendments will enhance the ability of market participants to price their orders in a competitive manner, reduce the amount of fees for accessing protected quotations, help to ensure that exchange fees are knowable when an order

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92 See also Proposing Release, supra note 11, at 80272 (discussing considerations of minimum pricing increments since Rule 612 was adopted) and 80287 (discussing considerations of access fee caps since Rule 610 was adopted). See also IEX Letter I at 5 (describing steps taken by the Commission since the adoption of Regulation NMS in 2005 to review the impact of Regulation NMS, including the solicitation of input from stakeholders, further stating, "[t]he history shows that the Commission's current Proposals do not arise in a vacuum. In fact, the Commission has deliberately considered the views of multiple stakeholders over years of review, and its current Proposals grow out of and build on that ongoing review.").

93 See Letter from Naureen Hassan, President, UBS Americas, Robert Karofsky, President, UBS Investment Bank, and Suni Harford, President, UBS Asset Management, dated Mar. 31, 2023 ("UBS Letter") at 10. See infra section V.B.3.b.i and section VII.D.4.a for discussions of the interaction between the round lot definition and the proposed changes to the minimum pricing increments.

94 See infra section VII.D.4.a (explaining that the interaction of the reduction in tick size and the MDI Rules' round lot definition would not have a material impact on the NBBO for affected stocks as such stocks would be exceptionally liquid, which should protect their NBBO from material deterioration).

is placed and provide transparency about orders in the market that are priced better than the NBBO. These changes will enhance the operation of the national market system and provide significant benefits to investors.

Another commenter stated that the Regulation NMS Proposal would increase "market data costs" because retail brokers would have to take in and store an increased amount of market data to comply with the changing minimum pricing increments, the MDI Rules' round lot definition, and the odd-lot information requirements and to update their systems accordingly, and because the exclusive SIPs may cause third-party data vendors to require additional hardware to support higher message rates.[95] As discussed below,[96] the Commission is adopting amendments to the minimum pricing increments with modifications from the proposal, which will lessen the potential costs identified by the commenter. Specifically, the Commission is adopting one minimum pricing increment for a smaller universe of NMS stocks than was proposed and is reducing the frequency of minimum pricing increment updates from a quarterly to a semiannual basis.[97] While this additional minimum pricing increment will likely require market participants to incur new technology costs to manage the new data, fewer changes are being adopted than were proposed and these changes are necessary and justified to address the issues related to constraints that have developed with the $0.01 minimum pricing increment.[98] Further, the costs

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95 See Letter from Derrick Chan, Head of Equities, Fidelity Capital Markets, dated Mar. 31, 2023 ("Fidelity Letter") at 17. The commenter described "market data costs" as those related to systems changes necessary to implement the new minimum pricing increments, round lot definition, and odd-lot information definition.

96 See infra section III.C.

97 See infra section III.C.7.a; section III.C.8; section VII.D.1.d section and section VII.F.1.c

98 See infra section VII.A; section VII.D.1.c (responding to comments raising concerns about increased message traffic increasing costs and stating: "[t]he Commission recognizes the potential for these costs articulated by the commenters but, considering additional information provided by commenters, expects these effects to be mild – including the effect on CAT costs.").

related to implementing the round lot definition were considered as part of the MDI Rules and the acceleration of the timing of implementation does not increase those costs. Although the Commission is modifying the round lot definition from the definition adopted in the MDI Rules, the modifications will reduce ongoing round lot implementation costs because round lots will be assigned less frequently, i.e., from a monthly basis to a semiannual basis, which means that systems will have to be updated less frequently. Synchronizing the dates of the changes to round lots and minimum pricing increments should also lower ongoing implementation costs for market participants by potentially decreasing the number of updates needed for their trading systems.[99] Finally, the costs related to implementing the odd-lot information definition were considered in the Proposing Release.[100] The adopted amendments, which will result in fewer systems changes than anticipated in the Proposing Release, will result in lower implementation costs than were contemplated in the proposal[101] and reduce the amount of data disseminated by the exclusive SIPs and any future competing consolidators as compared to what was contemplated in the Proposing Release.

One commenter stated that the implementation of various components of the Proposing Release at or around the same time (specifically access fees, minimum pricing increments and round lot sizes) could complicate the Commission's ability to assess the impact of a specific change and "whether other consequences will ensue."[102] To the specific concerns of this

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99 See infra notes 1594-1595 and accompanying text.

100 See Proposing Release, supra note 11, at 80334.

101 See infra section VII.D.5.

102 See Letter from Rich Steiner, Head of Global Market Structure, RBC Capital Markets, dated Mar. 31, 2023 ("RBC Letter") at 2. See also Letter from Nathaniel N. Evarts, Managing Director, Head of Trading, Americas, and Kimberly Russell, Market Structure Specialist, Global SPDR Business, State Street Global Advisors, dated Mar. 30, 2023 ("State Street Letter") at 5 (suggesting that the amendments to reduce the

commenter, the Commission has carefully considered the interacting effects of access fees, minimum pricing increments, and round lot sizes, see section VII. While the Commission acknowledges that staging amendments may make them easier to study, the nature of the adopted amendments will still make such study possible, even if implemented together. Namely, the set of stocks for which the tick size change applies tends to differ from the set of stocks for which round lot changes apply.[103] Access fee changes apply to some stocks that will not be directly affected by either round lot reform or tick size changes. Further, staging the amendments would delay the significant benefits of the amendments.[104]

Several commenters suggested implementing the proposed accelerated implementation of the round lot and odd-lot information definitions so that the effects of these definitions could inform other proposed changes.[105] Other commenters suggested that round lots should be implemented before the proposed changes to the minimum pricing increments, so that data based on the MDI Rules' round lots could inform changes to the minimum pricing increments.[106]

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access fee caps should be implemented before the minimum pricing increments to isolate the impact of the effects) and infra section VII.D.2.c (responding to the State Street Letter).

103 See infra note 801 for analysis identifying only two stocks that would have qualified for both the tick reduction and a reduction in the round lot as of Nov. 30, 2023. See also infra section VII.D.4.a for a discussion of the small overlap of the round lot definition and the tick size change.

104 See, infra, section II. The Commission recognizes that delaying the rule would likewise delay costs to affected parties.

105 See, e.g., Letters from Jennifer W. Han, Executive Vice President, Chief Counsel & Head of Global Regulatory Affairs, Managed Funds Association, dated Mar. 30, 2023 ("MFA Letter") at 14; Sarah A. Bessin, Deputy General Counsel, and Nhan Nguyen, Assistant General Counsel, Investment Company Institute, dated Mar. 31, 2023 ("ICI Letter I") at 2, 7; Gerald O'Reilly, Co-CEO and Chief Investment Officer, and Ryan Wiley, Global Head of Equity Trading, Dimensional Fund Advisors LP, dated Mar. 31, 2023 ("Dimensional Letter") at 2.

106 See Letter from Hubert De Jesus, Managing Director, Global Head of Market Structure and Electronic Trading, and Samantha DeZur, Managing Director, Global Public Policy Group, BlackRock, Inc., dated Mar. 31, 2023 ("BlackRock Letter") at 17; Dimensional Letter at 2.

While the dissemination of odd-lot information will result in the display of narrower spreads based on odd-lots, the calculation of the TWAQS for determining minimum pricing increments is based on round lots.[107] Therefore, odd-lot information will not have an impact on determining minimum pricing increments under Rule 612. Further, for the reasons discussed below, the interaction of the reduction in tick size and the MDI Rules' round lot definition will likely not have a material impact on the NBBO of affected stocks since only the most exceptionally liquid stocks would have prices over $250 and a TWAQS equal to or less than $0.015.[108] Therefore, it is not necessary to postpone amending the minimum pricing increments until data is analyzed using the MDI Rules' round lots.

In addition, the dissemination of odd-lot information in conjunction with the MDI Rules' round lot sizes will increase transparency about better priced orders and therefore should be implemented within a similar time frame.[109] Odd-lot information will be provided for all NMS stocks, not just those NMS stocks that may be assigned a smaller round lot. As discussed below, the number of NMS stocks that may be assigned a smaller round lot as of November 30, 2023 is 163 NMS stocks.[110] Therefore, while the MDI Rules' round lot sizes will provide transparency about some better priced orders in higher priced stocks, they will not enhance transparency about those orders that continue to be defined as odd-lots and will not increase transparency for NMS stocks priced at $250 or less. This transparency is important for investors as it will enhance their ability to assess the current pricing in the market for certain NMS stocks. Therefore, the odd-lot

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107 See infra section III.C.7.b.

108 See infra section V.B.3.b.i (identifying only two stocks – both highly liquid – that would have qualified for both a tick reduction and a reduction in the round lot as of Nov. 30, 2023).

109 See infra section VII.D.4.

110 Id.

information definition and the round lot definition each represents important, but different information that will enhance the usefulness of quotation information.

Some commenters recommended implementing the round lot definition but not the odd-lot information definition,[111] stating that implementing odd-lot information would be burdensome on the industry,[112] or would delay the implementation of the round lot definition by increasing the development work needed to be performed by the industry,[113] or that implementation of the odd-lot information definition "could lead investors to expect prices that are not available."[114] For the reasons discussed above, the implementation of both of these definitions is important to enhancing transparency for investors. The Commission has provided more time for implementing these data elements to accommodate the systems changes that will be necessary, therefore lessening implementation and development burdens on the industry.[115] Further, as discussed below, market participants may decide to provide information to their customers about the changes that are being implemented, such as how to understand the different

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111 See, e.g., Letters from Michael Blaugrund, Chief Operating Officer, NYSE, Jason Clague, Managing Director, Head of Operations, Charles Schwab & Co., and Joseph Mecane, Head of Execution Services, Citadel Securities, dated Mar. 6, 2023 ("NYSE, Schwab, and Citadel Letter") at 2; Jason Clague, Managing Director, Head of Operations, Charles Schwab & Co., Inc., dated Mar. 31, 2023 ("Schwab Letter II") at 6, 36; Ryan Kwiatkowski, Chairman of the Board, and James Toes, President & Chief Executive Officer, Security Traders Association, dated Apr. 3, 2023 ("STA Letter") at 8; Adam Nunes, Hudson River Trading LLC, dated Mar. 31, 2023 ("Hudson River Letter") at 2; Joanna Mallers, Secretary, FIA Principal Traders Group, dated Mar. 31, 2023 ("FIA PTG Letter II") at 4-5; BlackRock Letter at 12. See also infra section V.C.1.a. for a discussion of comments received on the accelerated implementation of the odd-lot information definition.

112 See FIA PTG Letter II at 4-5; Hudson River Letter at 2.

113 See FIA PTG Letter II at 4-5.

114 Schwab Letter II at 36.

115 See infra section VI.C.

prices, and how the changes may impact their order entry requirements. Investor notification and education can help investors understand the operation and impact of these data elements.[116]

II. Equity Market Structure Initiatives and the Regulation NMS Proposal

In December 2022, the Commission issued three other proposals related to separate aspects of equity market structure and Regulation NMS.[117] A number of commenters provided comments on all four EMS Proposals jointly.[118] One commenter stated that adoption of the Rule 605 Proposal is not a prerequisite to adoption of the other equity market structure proposals.[119]

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116 See infra section V.B.3.a.

117 See Securities Exchange Act Release Nos. 96943 (Dec. 14, 2022), 88 FR 3786 (Jan. 20, 2023) (proposal to amend rule 605 of Regulation NMS) ("Rule 605 Proposal"); 96945 (Dec. 14, 2022), 88 FR 128 (Jan. 3, 2023) (proposal to adopt a new rule under Regulation NMS that would enhance competition for the execution of marketable orders of individual investors) ("OCR Proposal"); and 96946 (Dec. 14, 2022), 88 FR 5440 (Jan. 27, 2023) (proposal to establish Commission rule-based best execution standards) ("Best Execution Proposal") (together, with the Proposing Release, the "EMS Proposals"). The Rule 605 Proposal was adopted on Mar. 6, 2024. See Rule 605 Amendments, supra note 10.

118 See, e.g., Letters from Thom Tillis, Bill Hagerty, Mike Crapo, Cynthia Lummis, and Kevin Cramer, United States Senate, dated Jan. 20, 2023 ("Tillis et al. Letter"); Ellen Greene, Managing Director, Equity and Options Market Structure, Securities Industry and Financial Markets Association, dated Feb. 8, 2023 ("SIFMA Letter I"); Joanna Mallers, Secretary, FIA Principal Traders Group, dated Feb. 15, 2023 ("FIA PTG Letter I"); Hope M. Jarkowski, General Counsel, NYSE Group, Inc., dated Mar. 13, 2023 ("NYSE Letter I"); John A. Zecca, Executive Vice President, Global Chief Legal, Risk & Regulatory Officer, Nasdaq, Inc., dated Mar. 30, 2023 ("Nasdaq Letter I"); Stephen John Berger, Managing Director, Global Head of Government & Regulatory Policy, Citadel Securities, dated Mar. 31, 2023 ("Citadel Letter I"); Adrian Griffiths, Head of Market Structure, MEMX LLC, dated Mar. 31, 2023 ("MEMX Letter"); Mehmet Kinak, Vice President and Global Head of Equity Trading, and Jonathan Siegel, Vice President and Managing Legal Counsel (Legislative & Regulatory Affairs), T. Rowe Price Associates, Inc., dated Mar. 31, 2023 ("T. Rowe Price Letter"); Bill Foster, French Hill, Henry Cuellar, Bill Huizenga, Wiley Nickel, Andy Barr, Ritchie Torres, Ann Wagner, Brittany Pettersen, Dan Meuser, Josh Gottheimer, Mike Flood, Vicente Gonzalez, Byron Donalds, Mike Quigley, Michael V. Lawler, David Scott, Andrew R. Garbarino, Gregory W. Meeks, Monica De La Cruz, Sean Casten, Scott Fitzgerald, Bradley S. Schneider, Erin Houchin, Jim Himes, Young Kim, Steven Horsford, Ralph Norman, Gwen Moore, Tom Emmer, Marc Veasey, and Zach Nunn, United States House of Representatives, dated Sept. 26, 2023 ("Foster et al. Letter"). See also Form Letter Type E, of which 14 comments were received, Form Letter Type F, of which 1,703 comments were received, and Form Letter Type G, of which 652 comments were received, available at https://www.sec.gov/comments/s7-30-22/s73022.htm.

119 See Letter from John Ramsay, Chief Market Policy Officer, Investors Exchange LLC, dated Oct. 13, 2023 ("IEX Letter III") at 3-5 (explaining how adoption of the amendments to rule 605 should not delay adoption of the access fee cap and minimum increment amendments, and stating, "the premise that Rule 605 updates must be a precondition to any other changes looks more like a calculated stall than an argument for careful, reasoned decision making").

However, some commenters stated that the Commission should consider an incremental approach and stagger the implementation of the four EMS Proposals because of the extent to which the proposed changes could impact the market and investors.[120] Some commenters suggested implementing only some of the proposed equity market structure changes, such as the Rule 605 Amendments or portions of the Regulation NMS Proposal.[121] Some commenters stated that the Rule 605 Proposal should be implemented first and that data from the changes implemented in the Rule 605 Proposal should be analyzed to assess whether the changes

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120 See, e.g., T. Rowe Price Letter at 3; BlackRock Letter at 17; FIA PTG Letter II at 2; Dimensional Letter at 1, 3; State Street Letter at 1-2; Letters from Jameson Schriber, Managing Director, Goldman Sachs & Co. LLC, dated Mar. 31, 2023 ("Goldman Sachs Letter") at 8-9; Kirsten Wegner, Chief Executive Officer, Modern Markets Initiative, dated Mar. 24, 2023 ("MMI Letter") at 2; William Capuzzi, Chief Executive Officer, Apex Fintech Solutions, Inc., dated Mar. 31, 2023 ("Apex Letter") at 14, 19; Michael Markunas, Deputy General Counsel, Chief Compliance Officer, B. Riley Securities, Inc., dated Mar. 31, 2023 ("B. Riley Letter") at 1; Kristen Malinconico, Director, Center for Capital Markets Competitiveness, U.S. Chamber of Commerce, dated Mar. 31, 2023 ("Chamber of Commerce Letter") at 2; Ellen Greene, Managing Director, Equity and Options Market Structure, Securities Industry and Financial Markets Association, dated Mar. 31, 2023 ("SIFMA Letter II") at 2, 22-23; William C. Thum, Managing Director and Assistant General Counsel, Securities Industry and Financial Markets Association Asset Management Group, dated Mar. 31, 2023 ("SIFMA AMG Letter I") at 2; Peter D. Stutsman, Global Head of Equity Trading, and Timothy J. Stark, Head of Equity Markets and Transaction Research, The Capital Group Companies, Inc., dated Mar. 31, 2023 ("Capital Group Letter") at 2, 5; Ann Wagner, United States House of Representatives, dated Nov. 28, 2022 ("Wagner Letter") at 2.

121 See, e.g., Letters from Stephen John Berger, Managing Director, Global Head of Government & Regulatory Policy, Citadel Securities, dated Mar. 31, 2023 ("Equity Market Structure Citadel Letter") at 21; Ellen Greene, Managing Director, Equities & Options Market Structure, and Joseph Corcoran, Managing Director, Associate General Counsel, Securities Industry and Financial Markets Association, dated Aug. 24, 2023 ("SIFMA Letter III") at 3; Steven M. Greenbaum, Senior Vice President, General Counsel, TradeStation Securities, Inc., dated Mar. 30, 2023 ("TradeStation Letter") at 7; Gregory Davis, Managing Director and Chief Investment Officer, and Matthew Benchener, Managing Director, Personal Investor, The Vanguard Group, Inc., dated Mar. 31, 2023 ("Vanguard Letter") at 2; Michael Camacho, Chief Executive Officer, Wealth Management Solutions, George C.W. Gatch, Chief Executive Officer, J.P. Morgan Asset Management, and Jason E. Sippel, Chief Executive Officer, J.P. Morgan Securities LLC, JPMorgan Chase & Co., dated Mar. 31, 2023 ("JPMorgan Letter") at 2; Jiří Król, Deputy Chief Executive Officer, Global Head of Government Affairs, Alternative Investment Management Association, dated Mar. 31, 2023 ("AIMA Letter") at 3; John L. Thornton, Co-Chair, Hal S. Scott, President, and R. Glenn Hubbard, Co-Chair, Committee on Capital Market Regulation, dated Mar. 31, 2023 ("CCMR Letter") at 46; Douglas A. Cifu, Chief Executive Officer, Virtu Financial, Inc., dated Mar. 30, 2023 ("Virtu Letter II") at 4; Andrew M. Saperstein, Co-President, Morgan Stanley, dated Mar. 31, 2023 ("Morgan Stanley Letter") at 2-3, 6 and 7; Steve Quirk, Chief Brokerage Officer, Robinhood Markets, dated Mar. 31, 2023 ("Robinhood Letter") at 46; MFA Letter at 14; FIA PTG Letter II at 2, 4, 7; NYSE Letter I at 10-11; SIFMA Letter II at 11, 23; State Street Letter at 3; Chamber of Commerce Letter at 1; STA Letter at 10-11; T. Rowe Price Letter at 3; Verret Letter I at 1, 5, 11; MMI Letter at 2-3; BlackRock Letter at 17; Capital Group Letter at 5; UBS Letter at 1-2; Foster et al. Letter at 1, 2; Fidelity Letter at 2, 5.

proposed in the Regulation NMS Proposal should be made.[122] Some commenters stated that, in light of the Commission's approval of the amendments to rule 605, the Commission should defer or suspend action on the Regulation NMS Proposal (and the two remaining EMS Proposals) and re-evaluate whether to proceed after the amendments to rule 605 have been implemented and the data collected following implementation has been analyzed.[123] One commenter suggested implementing the round lot and odd-lot information definitions after implementation of the Rule 605 Proposal, and thereafter pausing to assess the impact of the changes on the markets.[124]

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122 See, e.g., Letters from David Howson, Executive Vice President, Global President, Cboe Global Markets, Nathaniel N. Evarts, Managing Director, Head of Trading, Americas, State Street Global Advisors, Kimberly Russell, Market Structure Specialist, Global SPDR Business, State Street Global Advisors, Mehmet Kinak, Global Head of Equity Trading, T. Rowe Price, Todd Lopez, Americas Head of Execution Services, UBS Securities LLC, and Douglas A. Cifu, Chief Executive Officer, Virtu Financial Inc., dated Mar. 24, 2023 ("Cboe, State Street, et al. Letter") at 1-2, 3; Michelle Bryan Oroschakoff, Managing Director, Chief Legal Officer, LPL Financial LLC, dated Mar. 31, 2023 ("LPL Financial Letter") at 4; Schwab Letter II at 6, 37; UBS Letter at 1-2; Apex Letter at 14-15; MFA Letter at 6; SIFMA Letter II at 11, 22; SIFMA AMG Letter I at 2; T. Rowe Price Letter at 3; Vanguard Letter at 2, 7; JPMorgan Letter at 2; AIMA Letter at 3; CCMR Letter at 46; UBS Letter at 1-2, 10; Virtu Letter II at 4; Foster et al. Letter at 1, 2; Capital Group Letter at 5; Morgan Stanley Letter at 2, 6-7; Fidelity Letter at 2, 5, 27; Letter from Ann Wagner, Andrew R. Garbarino, Frank D. Lucas, Bill Huizenga, Tom Emmer, Dan Meuser, Zach Nunn, Pete Sessions, French Hill, Bryan Steil, Michael V. Lawler, Erin Houchin, United States House of Representatives, dated June 27, 2024 ("Wagner et al. Letter"). Some commenters suggested adopting only the Rule 605 Amendments and portions of the Regulation NMS Proposal and then evaluating the impact of those changes on the market. See Letter from Melanie Ringold, Head of Legal, Americas, and Will Geyer, Global Head of Capital Markets, Invesco Ltd., dated Mar. 31, 2023 ("Invesco Letter") at 2, 5; Hudson River Letter at 1-2; TradeStation Letter at 7.

123 See, e.g., Letters from Barbara Comstock, Executive Director, American Consumer & Investor Institute, dated May 20, 2024 ("ACII Letter II") at 1 and 3; Ellen Greene, Managing Director, Equities & Options Market Structure, SIFMA, and Joseph Corcoran, Managing Director, Associate General Counsel, SIFMA, dated 14, 2024 ("SIFMA Letter IV"); Ellen Greene, Managing Director, Equities & Options Market Structure, SIFMA, Joseph Corcoran, Managing Director and Associate General Counsel, SIFMA, William C. Thum, Managing Director and Associate General Counsel, dated Aug. 13, 2024 ("SIFMA AMG Letter II") at 1-2; Thomas H. Merritt, Deputy General Counsel, Virtu Financial, Inc., dated June 21, 2024 ("Virtu Letter III"). See also Letters from Dan Meuser, Ann Wagner, Frank Lucas, Pete Sessions, Bill Huizenga, French Hill, Andrew Garbarino, Young Kim, Bryon Donalds, Michael V. Lawler, Zach Nunn, United States House of Representatives, dated June 27, 2024 ("Meuser et al. Letter") at 2; Michael V. Lawler, United States House of Representatives, dated July 9, 2024 ("Lawler Letter") at 1; Wagner et al. Letter at 1-2.

124 See State Street Letter at 3.

The Commission disagrees with comments urging delayed implementation of the Regulation NMS Proposal, either in its entirety or portions of it, as delaying these amendments will delay significant benefits for investors.[125] The amendments adopted in this release revise several provisions of Regulation NMS to benefit investors. The Commission is adopting amendments to Rule 612 that will benefit investors and other market participants by allowing certain NMS stocks to be priced in increments that are smaller than the preexisting rule allowed, which will lower transaction costs and introduce greater competition on price into the market. The adopted amendments to Rule 610 will lower costs for investors and other market participants by reducing the access fee caps and will help to address distortions in the market associated with the preexisting fee caps. Additionally, the amendments will require all exchange fees charged and rebates paid for the execution of an order to be determinable at the time of execution, allowing investors and other market participants the ability to know with certainty the costs of their transactions at the time of the trade and to allow investors to more readily request details about the fees and rebates applicable to their orders. Accelerating the implementation of the MDI Rules' round lot and odd-lot information definitions will provide investors and other market participants that use SIP data with transparency about better priced quotes and orders that are available in the market but only visible to subscribers of exchange proprietary data feeds sooner than originally planned. The amendments provide important investor benefits, which are discussed throughout. Therefore, the Commission is not delaying adopting the amendments.

With respect to the Rule 605 Amendments, the Commission does not agree with commenters that stated that amended rule 605 data must be analyzed before adoption of the

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125 See supra notes 121-124 and accompanying text. See also supra note 104.

changes in this release.[126] The amendments adopted in this release are not dependent on rule 605 data nor is the data from rule 605 reports necessary before the Commission makes changes to better protect investors and benefit the markets more broadly.[127] While the Rule 605 Amendments will bring improvements to disclosures for order executions of NMS stocks,[128] the Regulation NMS amendments address other structural concerns relating to investors' trading and the lack of transparency in the national market system. For example, quoted spreads for NMS stocks could not get tighter than $0.01 under preexisting Rule 612 for all quotes and orders in NMS stocks that were priced equal to, or greater than, $1.00 per share.

The Commission disagrees with the commenter that stated that the Commission should implement the round lot and odd-lot information definitions after the implementation of the Rule 605 Amendments and then wait to assess the effects of these changes.[129] The commenter stated that it supported the round lot and odd-lot information definitions but stated, without providing details or any other support, that "these changes could have unintended impacts on price discovery, routing complexity, and trading costs."[130] The Commission adopted the definitions in 2020 to provide transparency about better priced orders that are available in the market but are not fully transparent in NMS information. These definitions will result in the provision to market participants of important information about the prices at which market participants are willing to trade and therefore will enhance price discovery. Market participants may have to assess their

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126 See supra note 122.

127 Although the amendments adopted in this release are not dependent on the implementation of the Rule 605 Amendments, the amendments adopted in this release will enhance the usability of information in the recently amended rule 605 reports. See infra section VII.D.6.a.ii.

128 See Rule 605 Amendments, supra note 10.

129 See State Street Letter at 3.

130 See State Street Letter at 3.

order routing decisions based on this enhanced transparency of better priced orders that are available in the market.[131]

As discussed below, the data analysis performed by the Commission and other market participants to assess changes in minimum pricing increments and the access fee caps were not derived from rule 605 reports.[132] While one commenter stated that rule 605 data should be used to assess the amendments adopted in this release, the Commission has utilized relevant and sufficient data other than rule 605 data that fully and robustly support the amendments.[133] One commenter states that if this proposal were to be finalized along with the amendments to Rule 605, "it appears that market participants and regulators would be unable to accurately assess the true impact of the market structure changes contained in this Proposal, precluding an 'apples-to-apples' before-and-after comparison."[134] However, market participants have other data with which to analyze the effects of these amendments.

Some commenters stated that the EMS Proposals would have an impact on each other.[135] Some commenters stated that the EMS Proposals should have been analyzed together to assess

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131 See Rule 605 Amendments, supra note 10, at 26482 (stating, "Rule 605's price improvement statistics that are relative to the best available displayed price will not be required to be reported until six months after odd-lot order information needed to calculate the best available displayed price is made available pursuant to an effective national market system plan.").

132 See infra section VII.D.6.a.iii (stating that the Commission did not rely on rule 605 data in its analyses in the Proposing Release and in this release).

133 See id. The Commission also has considered the interaction of the compliance dates of the adopted amendments with the compliance date of the Rule 605 Amendments. See infra section VI; section VII.D.6.b.

134 See Citadel Letter I at 29.

135 See, e.g., NYSE, Schwab, and Citadel Letter at 2; STA Letter at 4, 10-11; T. Rowe Price Letter at 3; RBC Letter at 2 and 5; Nasdaq Letter I at 1, 6; Dimensional Letter at 1-2; FIA PTG Letter II at 2; Schwab Letter II at 3, 37; Apex Letter at 14-15, 19; JPMorgan Letter at 2-3; Chamber of Commerce Letter at 2; BlackRock Letter at 3, 17; MMI Letter at 2-3, 9; B. Riley Letter at 2; Capital Group Letter at 5; Letters from Ari Rubenstein, CEO, GTS Securities LLC, dated Mar. 31, 2023 ("GTS Letter") at 4, 9; Jatin Suryawanshi, Managing Director, Head of Global Quantitative Strategies, and Anna Ziotis Kurzrok, Managing Director, Head of Market Structure, Jefferies, LLC, dated May 2, 2023 ("Jefferies Letter") at 1.

how the proposals would relate to, and operate with, each other.[136] One group of members of Congress recommended that no equity market structure rule "should be finalized or implemented" until the Commission "[c]onduct[s] a comprehensive cost-benefit analysis of the aggregate impact of [these rules] and seek[s] public comment on this analysis[,]" and the Commission proposes "a reasonable, workable, and staggered schedule for public comment on the adoption and implementation of the proposals, considering their overlapping nature,

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See also Letters from Patrick McHenry, French Hill, Frank Lucas, Pete Sessions, Bill Posey, Blaine Luetkemeyer, Bill Huizenga, Ann Wagner, Andy Barr, Roger Williams, Tom Emmer, Barry Loudermilk, Alexander X. Mooney, Warren Davidson, John Rose, Bryan Steil, William Timmons, Ralph Norman, Dan Meuser, Scott Fitzgerald, Andrew R. Garbarino, Young Kim, Byron Donalds, Mike Flood, Michael V. Lawler, Zach Nunn, Monica De La Cruz, Erin Houchin, and Andy Ogles, United States House of Representatives, dated Sept. 26, 2023 ("McHenry et al. Letter") at 2; Ronald C. Parker, President and CEO, National Association of Securities Professionals, dated Feb. 28, 2023 ("NASP Letter") at 4; State Street Letter at 2.

136 See, e.g., SIFMA Letter I at 1; SIFMA Letter II at 3, 8-9, 11, 12-13; SIFMA AMG Letter I 4-5; GTS Letter at 4-5; Hudson River Letter at 1; UBS Letter at 2; NYSE, Schwab, and Citadel Letter at 1; Citadel Letter I at 2, 28-29; Schwab Letter II at 2-3, 37; Virtu Letter II at 5, 19-20, 31-35, 55-57; MMI Letter at 2; Nasdaq Letter I at 6-7; Invesco Letter at 2; Goldman Sachs Letter at 3; Robinhood Letter at 7, 22, 24, 42, 44; Apex Letter at 14, 15; McHenry et al. Letter at 1, 2; CCMR Letter at 46; Chamber of Commerce Letter at 3; Equity Market Structure Citadel Letter at 13-14; Letters from JJ Kinahan, President, Tastytrade, Inc., dated Mar. 30, 2023 ("Tastytrade Letter") at 2; Jason Clague, Managing Director, Head of Operations, Charles Schwab & Co., dated Mar. 22, 2023 ("Schwab Letter I") at 2; Eric J. Pan, President and CEO, and Susan Olson, General Counsel, Investment Company Institute, dated Aug. 17, 2023 ("ICI Letter II") at 2-3, 7-9; Mary Lou H. Ivey, Chairman of the Boards and Independent Trustee, David J. Urban, Independent Trustee, and Theo H. Pitt, Jr., Independent Trustee, Independent Trustees of ETF Opportunities Trust and World Funds Trust, dated Mar. 31, 2023 ("Independent Trustees Letter") at 1-2; Stephen John Berger, Managing Director, Global Head of Government & Regulatory Policy, Citadel Securities, dated Dec. 5, 2023 ("Citadel Letter II") at 1, 10; Christopher A. Iacovella, President & Chief Executive Officer, American Securities Association, dated Mar. 31, 2023 ("ASA Letter") at 2, 3; Seth A. Miller, President, Cambridge Investment Research, Inc. dated Mar. 31, 2023 ("Cambridge Letter") at 3; Nicolas Morgan, Founder and President, Investor Choice Advocates Network, dated Mar. 31, 2023 ("ICAN Letter") at 2; Rebekah Goshorn Jurata, General Counsel, American Investment Council, dated Aug. 8, 2023 ("AIC Letter") at 2, 5, 10; James Angel, Associate Professor of Finance, Georgetown University, dated Mar. 31, 2023 ("Angel Letter") at 2; see also Letter from Jonathan Kanter, Assistant Attorney General, Doha Mekki, Principal Deputy Assistant Attorney General, Maggie Goodlander, Deputy Assistant Attorney General, David Lawrence, Policy Director, Karina Lubell, Chief, Competition Policy & Advocacy Section, Ihan Kim, Attorney Advisor, Competition Policy & Advocacy Section, and Owen M. Kendler, Chief, Financial Services, Fintech & Banking Section, United States Department of Justice, dated Apr. 11, 2023 ("DOJ Letter") at 6.

significant compliance and operational burdens, and if they may be insurmountable for smaller or emerging firms."[137]

As discussed below in the economic analysis, the Commission uses as a baseline the world as it exists at the time of adoption, including adopted rules but not proposed rules.[138] Each release, like this release and the Rule 605 Amendments (which were adopted prior to the amendments in this release), explains fully the rationale for the particular rulemaking and includes a robust economic analysis of the rules being adopted, including the possible economic effects that commenters raised with regard to specific interactions between the amendments and the Rule. In addition, comments on how the adoption of the amendments should affect the timing or sequence of the other EMS Proposals will be considered if and when those rules are adopted. The economic analysis considers potential economic effects arising from any overlap in compliance dates between these amendments and other recent amendments.[139] Similarly, the effects of the amended rules are measured against the existing regulatory baseline, which includes recently adopted rules.[140]

Commenting on the Proposing Release together with the other EMS Proposals, some commenters requested that the Commission publicly release anonymized subsets of CAT data[141]

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137 See McHenry et al. Letter at 2.

138 See infra section VII.C.

139 See infra sections VII.C and VII.D.6.

140 The OCR Proposal and the Best Execution Proposal Release mentioned by commenters remain at the proposal stage. To the extent that the Commission takes final action on either of those proposals, the baseline in each of those subsequent rulemakings will reflect the regulatory landscape that is current at that time. See infra section VII.C, note 1047.

141 The CAT database contains confidential market information. See, e.g., Securities Exchange Act Release No. 67457 (Jul. 18, 2012), 77 FR 45722, 45782 (Aug. 1, 2012) (stating that maintaining the confidentiality of customer and other information reported to CAT "is essential" and that "[w]ithout adequate protections, market participants would risk the exposure of highly-confidential information about their trading strategies

used in connection with the tables and figures in the EMS Proposals' economic analyses.[142] In the Proposing Release, unlike certain of the other EMS Proposals, CAT data was not used in any tables and figures.[143] Rather, the Proposing Release used CAT data to determine the numbers of affected broker-dealers in the baseline and compliance cost discussion in the economic analysis, as well as to determine statistics in a reasonable alternative to the proposed amendment that would have imposed a minimum pricing increment for trades.[144] The CAT information used in this adopting release is narrower still. Specifically, the Commission uses CAT information, consisting of lists of firm names, including firm identifier numbers and account type information, only to determine the numbers of affected firms. The Commission is not releasing anonymized versions of the CAT information used in this release because releasing an anonymized list of firm names would provide no meaningful information beyond the total number of affected firms, which is the same information provided in this release. The Commission described in the Proposing Release and describes in this release the CAT data and methodology used in connection with its estimates.

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and positions"); see also Securities Exchange Act Release No. 84696 (Nov. 15, 2016), 81 FR 84696 (Nov. 23, 2016).

142 See, e.g., SIFMA Letter I at 1-2, 3-4; Letters from Thomas M. Merritt, Deputy General Counsel, Virtu Financial, Inc., dated Feb. 24, 2023 ("Virtu Letter I") at 1, 2; SIFMA Letter II at 2-3, 11, 22; SIFMA AMG Letter I at 5; Schwab Letter II at 3-4; T. Rowe Price Letter at 3; Chamber of Commerce Letter at 2-3; Robinhood Letter at 8; Equity Market Structure Citadel Letter at 16-17; Cambridge Letter at 4; Jefferies Letter at 1; SIFMA AMG Letter II at 5-7; and SIFMA Letter IV at 6.

143 See SIFMA Letter I at 7 ("Regulation NMS: Minimum Pricing Increments, Access Fees, and Transparency of Better Priced Orders – The following tables/figures within the Proposal use CAT data: none."). The Commission responds to specific comments on releasing the CAT data used in the tables and figures of the specific EMS Proposals in the relevant adopting release, where appropriate. See Rule 605 Amendments, supra note 10.

144 See, e.g., Proposing Release, supra note 11, at 80316, 80340-41. A commenter identifies this limited use of CAT data in the Proposing Release but does not identify specific additional information the Commission should provide. See Equity Market Structure Citadel Letter at 16-17.

III. Final Rule 612 of Regulation NMS – Minimum Pricing Increment

Rule 612 of Regulation NMS establishes minimum pricing increments (also known as minimum price variations or tick sizes) for quotations and orders in NMS stocks. Specifically, preexisting Rule 612 stated that "[n]o national securities exchange, national securities association, alternative trading system, vendor, or broker or dealer shall display, rank, or accept from any person a bid or offer, an order, or an indication of interest in any NMS stock priced in an increment smaller than $0.01 if that bid or offer, order, or indication of interest is priced equal to, or greater than, $1.00 per share."[145] Preexisting Rule 612(b) had similar language that applied to bids, offers, orders, and indications of interest in any NMS stock priced less than $1.00 per share and specified that the minimum pricing increment could not be smaller than $0.0001. Preexisting Rule 612 of Regulation NMS did not establish or include minimum pricing increments for transactions.[146]

A. Issues Raised in the Existing Market Structure Related to Tick Sizes

The Proposing Release contains an extensive discussion of the development and the consideration by the Commission and market participants of Rule 612 since its adoption.[147] Since the adoption of Rule 612, there has been a marked increase in the trading volume of NMS stocks that would likely be priced with tighter spreads if their pricing was not constrained by the uniform $0.01 minimum pricing increment required by preexisting Rule 612 for quotes and

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145 See 17 CFR 242.612.

146 As discussed in the Proposing Release, the Commission granted exemptions from Rule 612 to various national securities exchanges' retail liquidity programs ("RLPs") as a way to allow them to compete with over-the-counter ("OTC") market maker sub-penny price improvement. See Proposing Release, supra note 11, at 80271. Under the RLPs, exchanges can accept and rank certain quotes and orders from certain participants in sub-penny increments as small as $0.001.

147 See Proposing Release, supra note 11, at 80272-80273.

orders all NMS stocks priced equal to, or greater than, $1.00 per share. Easing constraints on ticks for these NMS stocks will reduce transaction costs for market participants, including investors, and allow prices to be determined in a more competitive manner. In other words, the number and volume of NMS stocks that could benefit from the ability to quote in a minimum pricing increment that is smaller than $0.01 (i.e., sub-pennies) has grown.

In the Proposing Release, the Commission considered data to evaluate and determine which NMS stocks, by number and by volume, would benefit from a reduced minimum pricing increment for quotes and orders that would allow for tighter spreads. While the Commission could not estimate the number of stocks that would have a TWAQS of $0.008 or less due to the preexisting Rule 612 requirement that all orders priced equal to greater than $1.00 per share have a $0.01 minimum pricing increment, the Commission could estimate that 1,707 stocks, which represented approximately 64% of share volume and 37.9% of dollar volume in January through May 2022, had TWAQS that were less than $0.016.[148] Additionally, 2,648 stocks, which represented approximately 17.9% of share volume and 22.3% of dollar volume in January through May 2022, traded with a spread that was greater than $0.016 and less than or equal to $0.04. More recently, the Commission analyzed NMS stocks in 2023 and identified 2,420 NMS stocks that had a TWAQS of $0.015 or less; these NMS stocks represent about 74% of share volume and about 47% of dollar volume.[149]

Prior to the Proposing Release, certain market participants conducted data analyses on the effects of Rule 612 and concluded that a $0.01 minimum quoting increment may not be

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148 See Proposing Release, supra note 11, at 80280.

149 See infra section VII.D.1.b, Table 3.

appropriate for all NMS stocks that are priced greater than or equal to $1.00.[150] The Commission discussed these data analyses in the Proposing Release.[151] One of these market participants, Cboe, submitted updated data analysis in two comment letters to the Proposing Release.[152]

B. Proposal to Amend Rule 612

The Commission proposed variable minimum pricing increments for quotes and orders for NMS stocks priced at, or greater than, $1.00 per share based on the TWAQS of a particular NMS stock. The Commission also proposed that the minimum pricing increment for executions be the same as, and correlate to, the minimum pricing increment for quoting on all trading venues (i.e., on-exchange and OTC), subject to certain exceptions.

Specifically, the Commission proposed that the minimum pricing increments for quotations, orders and executions in NMS stocks that are priced equal to or greater than $1.00

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150 See, e.g., The Tick-Constrained Stock Problem by Phil Mackintosh (Jan. 20, 2022), available at http://www.nasdaq.com/articles/the-tick-constrained-stock-problem) ("Nasdaq Paper"). See also Petition for Rulemaking to Amend Rule 612 of Regulation NMS to Adopt Intelligent Tick-Size Regime, dated Dec. 16, 2019, submitted by John A. Zecca, Executive Vice President, Chief Legal Officer & Chief Regulatory Officer, Nasdaq Inc. available at https://www.sec.gov/rules/petitions/2019/petn4-756.pdf ("Nasdaq Intelligent Tick Proposal"); The Impact of Tick-constrained Securities on the U.S. Equity Market (available at http://www.nyse.com/publicdocs/Tick_Constrained_Stocks.pdf) ("NYSE White Paper") (no date available); and Cboe Proposes Tick-Reduction Framework to Ensure Market Structure Benefits All Investors (available at https://www.cboe.com/insights/posts/cboe-proposes-tick-reduction-framework-to-ensure-market-structure-benefits-all-investors/) ("Cboe Proposal").

151 See Proposing Release, supra note 11, at 80274-80278.

152 See Letters from Angelo Evangelou, Cboe Global Markets, Inc., dated Feb. 28, 2023 ("Cboe Letter I"); Patrick Sexton, EVP, General Counsel & Corporate Secretary, Cboe Global Markets, Inc., dated Mar. 31, 2023 ("Cboe Letter II") at Appendix A. See also Letter from Hope M. Jarkowski, General Counsel, NYSE Group, Inc., dated Mar. 27, 2023 ("NYSE Letter II") (submitting for the record its paper entitled Price Improvement, tick harmonization & investor benefit (Aug. 22, 2022). This paper was described in the Proposing Release, supra note 11, at 80275; MEMX Letter, Appendix (submitting Tick-constrained Securities (Aug. 2021). This paper was described in the Proposing Release, supra note 11, at 80274. In the MEMX Letter, MEMX also submitted Tick-constrained Securities, The Tick Size Debate, Revisited (Jan. 2022) which analyzed a set of reverse splits on certain low-priced ProShares exchange-traded products ("ETPs") and finding that the tick-constrained ETPs analyzed traded with significantly lower spreads post reverse split. This paper was described in the Proposing Release, supra note 11, at 80318.

per share would be variable and no smaller than: (1) $0.001 if the TWAQS[153] for the NMS stock during the Evaluation Period[154] was equal to, or less than, $0.008; (2) $0.002, if the TWAQS for the NMS stock during the Evaluation Period was greater than $0.008 but less than, or equal to $0.016; (3) $0.005, if the TWAQS for the NMS stock during the Evaluation Period was greater than $0.016 but less than, or equal to, $0.04; and (4) $0.01 if the TWAQS for the NMS stock during the Evaluation Period was greater than $0.04.[155] Further, as proposed, NMS stocks' TWAQS would have been measured quarterly based on one month of trading data.[156] In other words, it was proposed that the assignment of minimum pricing increments for the quoting and trading of NMS stocks priced equal to or greater than $1.00 per share be done on a quarterly basis.

The Commission stated that it preliminarily believed that the proposed Rule 612 amendments would promote: (1) fair and orderly markets and economically efficient executions, particularly for tick-constrained NMS stocks and retail order flow; and (2) fair competition and equal regulation between OTC market makers, exchanges, and ATSs that compete for retail liquidity by requiring that NMS stocks trade with the same minimum pricing increment regardless of venue (i.e., on or off-exchange).[157] The Commission also stated that proposed Rule 612 would promote price discovery and price competition, particularly for tick-constrained stocks and retail order flow, by permitting the uniform quoting and trading of NMS stocks across

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153 See infra section III.C.7.b. See also proposed Rule 612(a).

154 See infra section III.C.7.a. See also proposed Rule 612(a).

155 See proposed Rule 612(c).

156 See proposed Rule 612(a).

157 See Proposing Release, supra note 11, at 80273 (discussing the competitive dynamic among exchanges, ATSs and OTC market makers).

trading venues, in finer increments, based on objective criteria. The Commission preliminarily believed that the proposed Rule 612 amendments would result in the pricing of quotes and orders being more in alignment with the principles of supply and demand.

C. Final Rule - Minimum Pricing Increments for Orders Priced Equal to or Greater than $1.00 per Share

After considering comments, and analyzing additional data in response to those comments, the Commission is modifying and adopting the proposed amendments to Rule 612. As adopted, Rule 612(b)(2) provides that no national securities exchange, national securities association, ATS, vendor, or broker or dealer shall display, rank, or accept from any person a bid or offer, an order, or an indication of interest in any NMS stock in an increment smaller than required pursuant to either paragraph (i) or (ii) below if that bid or offer, order, or indication of interest is priced equal to or greater than $1.00 per share:

(i) $0.01, if the Time Weighted Average Quoted Spread for the NMS stock during the Evaluation Period was greater than, $0.015; or

(ii) $0.005, if the Time Weighted Average Quoted Spread for the NMS stock during the Evaluation Period was equal to or less than $0.015.

Rule 612(b)(3) provides that no national securities exchange, national securities association, alternative trading system, vendor, or broker or dealer shall display, rank, or accept from any person a bid or offer, an order, or an indication of interest in any NMS stock priced in an increment smaller than $0.0001 if that bid or offer, order, or indication of interest is priced less than $1.00 per share.[158]

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158 Rule 612(b)(3) is the same as preexisting Rule 612(b).

Further, as amended, minimum pricing increments for quotes and orders will be assigned on a semiannual basis using 3-months of trading data to calculate each NMS stock's TWAQS.[159] Therefore, as adopted, a minimum pricing increment of either $0.01 or $0.005 will be assigned to each NMS stock for quotes and orders that are priced equal to or greater than $1.00 per share twice a year and will be operative for a six-month period.[160]

The amendment differs from the proposal because rather than adding three proposed smaller minimum pricing increments for quotes and orders ($0.005, $0.002, $0.001) to the current $0.01 increment, only one additional minimum pricing increment ($0.005) for NMS stocks that have a TWAQS of $0.015 or less will be added. In addition, the amendment differs from the proposal as it (1) does not include a minimum pricing increment for trades, (2) modifies the Evaluation Period, and (3) provides for an implementation period.

1. General Comments and Discussion

The Commission received many comments on the proposal to amend Rule 612.[161] Some commenters supported the need to amend Rule 612.[162] Many individual commenters generally

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159 See Rule 612(a)(1).

160 Some commenters suggested that the Commission consider wider quoting increments. See, e.g., Nasdaq Letter I; ASA Letter at 4; MEMX Letter at 20; Cboe, State Street, et al. Letter at 2; BIO Letter at 3; Invesco Letter at 3; Robinhood Letter at 39; Themis Letter at 5; Dimensional Letter at 2; and Letter from Tim Gately, Managing Director, Head of Equities Sales, Americas, Citigroup Global Markets, Inc., dated Mar. 31, 2023 ("Citigroup Letter") at 5. The Commission is not adopting a wider quoting increment for NMS stocks or a subset of NMS stocks as part of these amendments. As discussed throughout this release, the Commission is amending Rule 612 to address issues that developed related to the constraint that results from the $0.01 minimum pricing increment. A wider quoting increment would not address these specific issues.

161 See supra note 82.

162 See, e.g., Form Letter Type A, of which 22 comments were received; Form Letter Type D, of which 255 comments were received; Form Letter Type G, of which 652 comments were received, available at https://www.sec.gov/comments/s7-30-22/s73022.htm; IEX Letter I at 6; Letters from David Mechner, Chief Executive Officer, Pragma, LLC, dated Mar. 23, 2023 ("Pragma Letter"); Citigroup Letter at 4; MMI Letter at 3; Cboe, State Street, et al. Letter at 2; Nasdaq Letter I at 2; Managed Funds Letter dated March 30, 2023 at 11; letter from Joseph Scafidi, Global Head of Trading, and Carlos Oliveira, Head of Trading

supported the proposed amendments;[163] while some individual commenters agreed that Rule 612 should be amended but recommended that the proposal be modified.[164]

Broadly, many commenters stated that preexisting Rule 612 should be amended in order to permit sub-penny quoting.[165] One commenter stated that for those stocks that are tick-constrained "[t]he one-cent increment for quoting can make it difficult for liquidity providers to fill orders and often results in higher trading costs."[166] Another commenter stated that tick-constrained stocks experience wider quoted spreads, which results in "significantly increased transaction costs for investors," and that these securities generally have longer queues and trade with "outsized notional liquidity at the NBBO."[167] Several commenters stated that the "one-size-fits-all" requirement in Rule 612 should be revisited.[168] One commenter stated that Rule 612 impedes the ability of market participants to price some NMS stocks that would naturally be

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Analytics and Market Structure, Brandes Investment Partners, L.P., dated Mar. 23, 2023 (endorsed by Adam Conn, Director, Baillie Gifford (Overseas) Ltd. et al.) ("Brandes Letter") at 1; Angel Letter at 5; TradeStation Letter; Vanguard Letter at 4; B. Riley Letter at 1; JPMorgan Letter at 4; and UBS Letter at 10.

163 See, e.g., Form Letter Type D, of which 255 comments were received; Form Letter Type E, of which 14 comments were received; and Form Letter Type G, of which 652 comments were received, available at https://www.sec.gov/comments/s7-30-22/s73022.htm; Letter from Bibambop RIP, dated Mar. 16, 2023; Letter from Binh Tran, dated Mar. 4, 2023; Letter from Jerry Pang, dated Mar. 4, 2023; Letter from Charlie Chen, dated Mar. 1, 2023; Letter from Daniel Song, dated Jan. 12, 2023; Letter from Deok Park, dated Dec. 26, 2023; and Letter from Clarissa West, dated Apr. 1, 2023.

164 See, e.g., Form Letter Type H, of which 853 comments were received, available at https://www.sec.gov/comments/s7-30-22/s73022.htm.

165 See, e.g., Letter from Stephen W. Hall, Legal Director and Securities Specialist, Better Markets, Inc., dated Oct. 31, 2023 ("Better Markets Letter II") at 3; SIFMA Letter II; Brandes Letter at 1; ICI Letter I; BlackRock Letter; B. Riley Securities Letter; JPMorgan Letter at 4; Cambridge Letter at 6; Invesco Letter at 3; UBS Letter at 10; Citigroup Letter at 4; TradeStation Letter at 6; letters from individuals, including the Form Letter Type D, of which 255 comments were received; Form Letter Type G, of which 652 comments were received; and Form Letter Type H, of which 853 comments were received, available at https://www.sec.gov/comments/s7-30-22/s73022.htm.

166 See ASA Letter at 4.

167 See MEMX Letter at 9.

168 See, e.g., SIFMA Letter II at 33; BlackRock Letter at 5; Citigroup Letter at 4; and MMI Letter at 5; UBS Letter at 10; Letter from Lawrence Harris, Ph.D, CFA, Professor of Finance and Business Economics, USC Marshall School of Business, dated Dec. 18, 2023 ("Harris Letter") at 8.

priced within the penny spread.[169] The adopted minimum quoting increment of $0.005 will enable the targeted NMS stocks to be more naturally priced based on the principles of supply and demand within the penny spread.

Generally, comments from individuals supported the proposal without any additional suggested changes.[170] One commenter stated of the proposal, "[t]his means that the pricing of stocks will be more precise and accurate, ensuring that I can get the best possible price for my trades."[171] Another commenter stated that "[a]llowing for sub-penny pricing will enable buyers to obtain lower prices from willing sellers and sellers to obtain higher prices from willing buyers, resulting in a more efficient market."[172] Comments from other market participants, including exchanges,[173] broker-dealers, and institutional investors[174] recommended modifying the proposal

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169 See Better Markets Letter II at 8.

170 See, e.g., Form Letter Type A, of which 22 comments were received ; Form Letter Type D, of which 255 comments were received; Form Letter Type E, of which 14 comments were received; Form Letter Type G, of which 652 comments were received; Form Letter Type I, of which 22 comments were received; Form Letter Type J, of which 15 comments were received; and Form Letter Type K, of which 22 comments were received, available at https://www.sec.gov/comments/s7-30-22/s73022.htm.

171 Letter from John dated Feb. 23, 2023.

172 Letter from Nevin Varghese dated Dec. 26, 2022.

173 See IEX Letter I at 6; Cboe, State Street, et al. Letter at 2; Nasdaq Letter I at 14; MEMX Letter at 18; and Cboe Letter II at 3.

174 See Capital Group Letter at 4; ICI Letter I at 5-6; Vanguard Letter at 4-5; Invesco Letter at 3; Schwab Letter II at 6; T. Rowe Price Letter at 4; Fidelity Letter at 14; Brandes Investment Letter dated March 31, 2023 at 2; Ontario Teachers, Alberta Investment, CalSTRS, CalPERS, Canada Pension, and Texas Retirement Letter dated Mar. 31, 2023 at 2 ("Ontario Teachers et al. Letter"); BlackRock Letter at 5; Dimensional Letter at 2; B. Riley Letter at 1; and Letter from Christopher P. Bowker Jr., Director of Global Equity Trading, Boston Partners Global Investors, Inc., Joe Mariano, Senior Vice President, Global Head of Trading, Calamos Advisors LLC, Melissa F. Hinmon, Director of Equity Trading, Glenmede Investment Management, Dan Royal, Global Head of Equity Trading, Janus Henderson Investors US LLC, dated Apr. 6, 2023 ("Boston Partners, Calamos Advisors, Glenmede Investment, and Janus Henderson Letter"); State Street Letter at 3; NYSE, Schwab, and Citadel Letter at 2; Letter from John Zhu, Head of Trading, Optiver US LLC, dated Mar. 15, 2023 ("Optiver Letter") at 4; Pragma Letter at 1; Cboe, State Street, et al. Letter at 2; Letter from Milan Galik, Chief Executive Officer, Interactive Brokers Group, Interactive Brokers LLC, dated Mar. 30, 2023 ("Interactive Brokers Letter") at 5; RBC Letter at 3; Morgan Stanley Letter at 3-4; JPMorgan Letter at 4-5; Letter from at 2; Joe Wald, Managing Director & Co-Head of Electronic Trading, Eric Stockland, Managing Director, Global Markets, Brad A. Rothbaum, Managing Director & Head U.S. Global Markets, Chief Operating Officer & Head of the U.S. Branches, and Michael Forlenza, Managing

to Rule 612 to reduce the number of potential minimum quoting increments. Some commenters stated that further reduction of the minimum pricing increment for quotes and orders may be warranted for certain NMS stocks "in the future" but that a $0.005 increment should be implemented and studied before any further reductions.[175] For the reasons discussed throughout, in response to commenters, the Commission is adopting amended Rule 612. Compared to the initial proposal, the modified amendments will be easier for market participants to implement and adapt to.

One commenter suggested that the Commission use its exemptive authority to reduce minimum pricing increments and access fees in a manner similar to that requested by MEMX.[176] MEMX requested an increment of $0.005 for NMS stocks that are "tick-constrained" (defined by MEMX as stocks that trade with an average quoted spread of $0.011 or less).[177] The commenter recommended this course of action as a means to gather data on sub-penny pricing increments to help determine whether, and to what degree, the proposed modifications were warranted.[178] The commenter also stated that using an exemption to test a reduction of minimum pricing increments and the access fee caps could include an expiration and a "roll-back" plan should unintended consequences become apparent.[179] Other commenters recommended that the Commission reduce the minimum pricing increments for a sample of stocks so that data could be

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Director & Head of U.S. Capital Markets Compliance, BMO Capital Markets Corp., dated Mar. 31, 2023 ("BMO Letter"); Brandes Investment Letter dated March 23, 2023 at 2; B Riley Letter at 1; Themis Letter ; UBS Letter at 10; Citigroup Global Letter at 4-5; and Jefferies Letter at 3.

175 See, e.g., BlackRock Letter at 6 and B. Riley Letter at 1.

176 See Jefferies Letter. See also Proposing Release, supra note 11, at 80277 for a discussion of the MEMX request for exemption.

177 See Proposing Release, supra note 11, at 80277 for a discussion of the MEMX request for exemption.

178 See Jefferies Letter at 2.

179 Id. at 4.

gathered and evaluated before changes were adopted on a more widespread basis.[180] Finally, one commenter recommended that the Commission establish a "transparent structured process to evaluate whether proposed changes to minimum pricing increments and access fees are actually improving the execution experience" and that a "clearly articulated off-ramp/kill-switch to unwind these changes" be in place to return to current minimum pricing increments and the access fee caps.[181] Another commenter stated that if the Commission adopted a modified amendment to Rule 612 that such modification should be re-proposed for public comment.[182]

An exemption, other temporary course of action, such as a pilot or sample reduction, or a re-proposal of the adopted amendments is not warranted. The Commission and market participants already have provided data and analyses that support amending Rule 612 to address tick constraints.[183] As discussed throughout this release, the adopted amendments to Rule 612 will allow NMS stocks that are experiencing tick constraints with the $0.01 minimum pricing increment to be priced more competitively (i.e., reduce quoted spreads) and reduce transaction costs for liquidity demanders. The amendments to minimum pricing increments are designed to appropriately address significant concerns related to Rule 612.[184] One of the primary goals of the proposal and the adopted amendments is to alleviate tick constraints.

Reducing the minimum quoting increment for quotes and orders to $0.005 for certain NMS stocks will enable such stocks to quote with tighter spreads, which in return reduces the

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180 See, e.g., Cboe, State Street, et al. Letter at 2; letter from Carlo Passeri, Vice President Biotechnology Innovation Organization ("BIO Letter"), dated Mar. 30, 2023; and State Street Letter at 3; MMI Letter at 3-7.

181 See Citigroup Letter at 6. With regard to the comment about an "off-ramp/kill-switch," should the Commission observe trends detrimental to investors, the Commission could take appropriate action.

182 See Citadel Letter II at 3.

183 See, e.g., MEMX Letter, Pragma Letter; IEX Letter I; and Nasdaq Letter I. See infra section VII.D.1.b.

184 See supra section III.A.

transaction costs of investors.[185] As discussed below, the Commission has conducted analysis to show that quoted and effective spreads are likely to decline such that costs of executing small and medium trades will likely decline.[186] Further, Rule 612, as amended, while simplified compared to the proposal, continues to be designed to address constraint concerns with respect to those NMS stocks. Market participants and investors will be able to more easily adapt to the amended tick regime because they will only need to accommodate, and adjust for, one additional minimum pricing increment that is already familiar for a limited, readily discernable, group of NMS stocks.[187] The $0.005 minimum pricing increment for quotes and orders, one of the three additional ticks proposed by the Commission, was widely supported by commenters.[188] Price improvement on exchanges and ATSs often occurs through midpoint executions in an increment of $0.005. Accordingly, $0.005 is an appropriate increment to introduce smaller, sub-penny minimum pricing increments in the national market system for quotes and orders priced equal to or greater than $1.00.

Some individual commenters did not support the proposal.[189] One of those commenters stated that the minimum pricing increment for quotes and orders should be "based solely on that which can be spent in real life; no less than a single penny."[190] Preexisting Rule 612 allowed quotes and orders in NMS stocks priced less than $1.00 per share to be accepted, ranked and

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185 See infra section VII.D.1.b.ii.

186 See infra section VII.D.1.b.ii.

187 See infra section VII.D.1.a.

188 See, e.g., MEMX Letter at 15-16. See also note 219 and accompanying text.

189 See, e.g., letters from Joshua Russell dated Dec. 27, 2022; Matthew Gayvin Mutman dated Mar. 7, 2023; Aswin Joy dated Mar. 7, 2023.

190 See Letter from Joshua Russell dated Dec. 27, 2022. But see letter from Anonymous dated Apr. 1, 2023 (stating "[g]etting more precise increment should be easy enough with our modern computers. At the gas station I get charged down to the .000th place, so why shouldn't our markets work the same? Seems fair to me.").

displayed in an increment as small as $0.0001. Similarly, certain RLP Programs for national securities exchanges have been granted Commission exemptions to permit quotes and orders in NMS stocks priced equal to, or greater than, $1.00 per share to be accepted, ranked and displayed in an increment as small as $0.001. Sub-penny increments also existed in the market for many years, even prior to the adoption of Rule 612 in 2005.[191] Sub-penny increments can allow market participants to better convey prices at which they are willing to trade, which can promote better price competition and lead to better price discovery. Further, as discussed above, sub-penny trading occurs frequently, whether at the midpoint or in other sub-penny increments.[192] Thus, sub-penny increments are not a novel concept. As discussed above, $0.005 is a common trading increment because of the use of midpoint orders under current Rule 612, and the ability to use such orders will not change under amended Rule 612. Nonetheless, the Commission understands that market participants may decide to provide investor notice and education about the availability of the new increment.[193]

Another commenter stated that the proposed variable minimum pricing increments were "not an effective solution to address concerns related to tick-constrained stocks" and suggested a

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191 Prior to decimalization, quotes and orders were made in increments that were fractions of a dollar, including 1/8, 1/16 and 1/32, which resulted in sub-penny pricing.

192 See supra section III.A.

193 One commenter stated that to the extent the minimum quoting increment is reduced, FINRA would need to update the Manning Rule (FINRA rule 5320 which protects customer limit orders by requiring a minimum amount of price improvement for a firm to execute an order on a proprietary basis while holding an unexecuted customer limit order—the minimum amount of price improvement is currently $0.01 for orders equal to or greater than $1) in an equivalent manner. See Citadel Letter I at 8. The compliance date of the adopted rule provides sufficient time for FINRA to determine whether it would want to amend the Manning Rule in light of the amendments to Rule 612 and to file a proposed rule change pursuant to Section 19(b) of the Exchange Act and rule 19b-4 thereunder.

uniform $0.001 minimum pricing increment for all NMS stocks.[194] A uniform $0.001 minimum pricing increment for all NMS stocks goes beyond what is necessary to address the issues related to NMS stocks that are currently constrained by the $0.01 tick. A $0.001 minimum pricing increment would be significantly smaller than the current uniform $0.01 minimum pricing increment for quotes and orders for NMS stocks that are priced equal to, or greater than, $1.00 per share. A sub-penny increment for NMS stocks that is too small would increase the incidence of stepping ahead (i.e., pennying)[195] and costs would not justify the benefits.

2. Specific Comments on the Proposed Minimum Pricing Increments

A few commenters did not support the implementation of the smallest proposed sub-penny increments (i.e., $0.002 and $0.001), and referenced certain concerns, including stepping ahead of displayed orders, quote flickering that occurs when the price of a trading center's best displayed quotations changes multiple times in a single second, and decreased depth.[196] Each of these were articulated as concerns by the Commission when Rule 612 was first adopted.[197]

Some commenters stated that having ticks that are too small would result in queue jumping[198] and decreased depth.[199] In the Regulation NMS Adopting Release, the Commission

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194 See Letter from Matthew Gayvin Mutman dated Mar. 7, 2023. The commenter suggested a uniform $0.001 minimum pricing increment for all NMS stocks. Comments related to the level of minimum pricing increment are addressed in the next section.

195 See infra note 994 defining pennying. See also infra section VII.D.1 for additional discussion of this topic.

196 See, e.g., Form Letter Type G Nasdaq Letter I; MFA Letter; Letter from Douglas Friedman, General Counsel, Tradeweb Markets Inc., dated Mar. 30, 2023 ("Tradeweb Markets Letter"); Virtu Letter II; State Street Letter; RBC Letter; Invesco Letter; ICI Letter I; Cboe Letter II; SIFMA Letter II; Vanguard Letter; JPMorgan Letter; Hudson River Letter; T. Rowe Price Letter at 4; Goldman Sachs Letter; Fidelity Letter; Citadel Letter I; Robinhood Letter; GTS Letter; BlackRock Letter; Citigroup Letter; Fidelity Letter at 11; Themis Letter at 3; and Tastytrade Letter at 20.

197 See Regulation NMS Adopting Release, supra note 4, at 37551.

198 See, e.g., MFA Letter at 11, State Street Letter at 3, and RBC Letter at 3,

199 See, e.g., Nasdaq Letter I at 13; MFA Letter at 11, Virtu Letter II at 15, State Street Letter at 3, and RBC Letter at 3.

discussed concerns related to stepping ahead of displayed quotations with orders priced in economically insignificant increments (i.e., to gain execution priority) which can deter the display of aggressively-priced limit orders that would narrow the spread.[200] In light of these comments, amended Rule 612 has been simplified compared to what was proposed. Thus, the Commission is only adding the $0.005 minimum pricing increment for quotes and orders for those NMS stocks that have a TWAQS of $0.015 or less. Because the $0.005 minimum pricing increment is based on the TWAQs of the NMS stock, the $0.005 minimum pricing increment, relative to the spread, will be economically significant for these stocks.[201]

Some commenters stated that smaller tick sizes would cause flickering quotations.[202] In the Regulation NMS Adopting Release, the Commission considered issues related to quote flickering.[203] The Commission stated that quote flickering can result in broker-dealers having difficulties in satisfying their best execution obligations and other regulatory responsibilities.[204] Because computer algorithms and ultra-fast connections dominate today's trading and quoting activities such concerns are not as acute or prevalent as they were at the time of the adoption of Rule 612.[205] Today's quotations are calculated and displayed in microseconds, which is significantly faster than in 2005 and while flickering quotations can exist today, computer systems are much better able to process them such that they should not cause compliance

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200 See Regulation NMS Adopting Release, supra note 4, at 37551.

201 See infra section VII.D.1.b.ii and notes 1300-1303 and accompanying text.

202 See, e.g., MFA Letter at 11, State Street Letter at 3, RBC Letter at 3, and Invesco Letter at 3.

203 See Regulation NMS Adopting Release, supra note 4, at 37551.

204 Id. at 37552.

205 See MDI Adopting Release, supra note 10, for a discussion about market data latencies. Flickering quotations is more of a concern when there is quote latency, in other words, when the displayed quotations do not reflect the actual quotations. For example, when the quote is being updated faster than the quote can be displayed, the price discovery mechanism may not be benefitted.

difficulties or investor confusion.[206] Accordingly, because of technological advancements, today's market structure, compared to 2005, can more readily handle rapid changes to a trading center's best bid or offer. Further, the concerns about the potential for flickering quotes should be mitigated to some extent because the amendments do not include the smaller proposed increments (i.e., $0.001 and $0.002) and are designed to have fewer ticks between the spread which will lessen the potential price changes between the spread.

Other commenters stated that the proposed minimum quoting increments of $0.002 and $0.001 were too small,[207] would introduce too many intra-spread ticks,[208] and could harm trading by substantially increasing fragmentation of liquidity.[209] The Commission also considered the impact of sub-penny quoting on market depth,[210] i.e., the number of shares available at the NBBO when it originally adopted quoting increments.[211] Decreased depth could lead to increased transaction costs and fragmentation.[212] Adopting only one additional minimum quoting increment instead of the proposed four-tier approach, should help address commenters' concerns with respect to fragmented liquidity[213] because there will be fewer price levels at which liquidity aggregates, which will result in less fragmentation. The modified amendment of Rule 612 does

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206 See Regulation NMS Adopting Release, supra note 4, at 37553 - 37554 (discussing the concerns with flickering quotes when Rule 612 was adopted and acknowledging that the market could evolve).

207 See, e.g., SIFMA Letter II at 33; Vanguard Letter at 5; Schwab Letter II at 35; Fidelity Letter at 11; JPMorgan Letter at 4; UBS Letter at 12; Citigroup Letter at 4; and Harris Letter at 7.

208 See, e.g., Pragma Letter, Robinhood Letter at 40; IEX Letter I at 9; and Angel Letter at 6. The adopted $0.005 minimum pricing increment will provide for at least three ticks intra-spread. See infra section VII.D.1.

209 See, e.g., Interactive Brokers Letter at 4; Virtu Letter II at 4; and Themis Letter at 3.

210 See infra section VII.D.1.b.

211 See Regulation NMS Adopting Release, supra note 4, at 37552.

212 See Regulation NMS Adopting Release, supra note 4, at 37552.

213 See Citadel Letter I at 7. See also Virtu Letter II at 2 and 6-7.

not include the proposed smaller minimum pricing increments for quotes and orders of $0.001 and $0.002, and thus commenters' concerns related to those increments (e.g., decreased depth at the NBBO) are not applicable.[214] As discussed, the Commission has determined to take an incremental approach in amending Rule 612 by only adding a $0.005 minimum pricing increment for those NMS stocks that are constrained by the preexisting, uniform minimum pricing increment based on an objective standard that is designed to have fewer ticks between the spread than the proposal.[215] As adopted, those NMS stocks that are assigned the $0.005 minimum pricing increment will result in three ticks intra-spread, which falls in the middle of the 2 to 4 ticks intra-spread suggested as potentially optimal by many commenters,[216] Finally, the Commission addresses its primary concern of relieving the constraint related to the $0.01 increment for certain NMS stocks by only adding the $0.005 minimum pricing increment and not adding minimum pricing increments of $0.002 and $0.001. The $0.005 minimum pricing increment for constrained NMS stocks will allow these stocks to quote more naturally and efficiently, and thereby reduce transaction costs for investors without the concerns that would attach if the minimum pricing increments were smaller.

3. Comments on the Number of Proposed Increments

Some commenters supported reducing the minimum pricing increment for quotes and orders to address those NMS stocks that are tick-constrained, but overall did not support the proposal's four minimum quoting increments.[217] Many commenters stated that the proposed

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214 See infra section VII.D.1.b.i.

215 See infra section III.C.6.

216 See infra note 1299 and accompanying text.

217 See, e.g., SIFMA Letter II at 34; AIMA Letter at 2; STA Letter at 6-7; Citadel Letter I at 30; Citigroup Letter at 4; Dimensional Letter at 2; BlackRock Letter at 3; Public Pension Letters dated Mar. 31, 2023;

quoting increments were too numerous.[218] Instead, a number of commenters recommended that the Commission adopt a modified, simpler amendment to Rule 612 and suggested only adopting one additional minimum quoting increment of $0.005 for tick-constrained NMS stocks.[219] One commenter said that "reducing the tick size to one-half cent for stocks with narrower spreads will address the current market need."[220] Commenters opposed the proposed four minimum quoting increments based on complexity for market participants to program into their systems these increments,[221] potential increased costs for investors,[222] and potential investor confusion with respect to minimum pricing increments that could change periodically as proposed.[223] Another commenter stated that the four-tier proposal would favor "high-frequency traders who have a long history of leveraging complexity to their advantage and to the detriment of ordinary investors."[224] One commenter stated that the proposed variable minimum pricing increments "as

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MMI Letter at 3; Brandes Letter at 1; Schwab Letter II at 35-36; Invesco Letter at 3; B. Riley Letter at 1; JPMorgan Letter at 4; Cambridge Letter at 6; and Tastytrade Letter at 18.

218 See, e.g., MFA Letter at 12; Capital Group Letter at 3; ICI Letter I ; Angel Letter at 6 ; Vanguard Letter at 5; and Meuser et al. Letter at 1.

219 See id. See also Nasdaq Letter I; MFA Letter; MEMX Letter; Capital Group Letter; ICI Letter I; Citadel Letter I; Citigroup Letter at 4; BlackRock Letter; Apex Letter; Ontario Teachers et al. Letter at 2; Citigroup Letter; GTS Letter; ICI Letter I; Invesco Letter; Robinhood Letter; SIFMA Letter II; STA Letter; UBS Letter; Vanguard Letter; TradeStation Letter at 6; Cboe Letter; IEX Letter; Nasdaq Letter I; and NYSE Letter I; Brandes Letter at 2; Invesco Letter at 2; Fidelity Letter at 14; Themis Letter at 6; B. Riley Letter at 1; JPMorgan Letter at 4; Morgan Stanley Letter at 4; State Street Letter at 3; Dimensional Letter at 2; BMO Capital Letter at 2; and Meuser et al. Letter at 1.

220 See ASA Letter at 5. See also TradeStation Letter at 6.

221 See, e.g., CTA/UTP Letter dated March 29, 2023; Nasdaq Letter I; State Street Global Letter; RBC Letter; ICI Letter I; Vanguard Letter; Cboe Letter II; SIFMA Letter II; Fidelity Letter; Brandes Letter at 2; Robinhood Letter at 20; Morgan Stanley Letter at 4; and Meuser et al. Letter at 2.

222 See, e.g., Dimensional Letter at 2.

223 See, e.g., Tastytrade Letter at 5, 18; SIFMA Letter II at 7; Morgan Stanley Letter at 3, 4; Fidelity Letter at 13; SIFMA Letter II at 34; Better Markets Letter I at 14; Robinhood Letter at 20; Citadel Letter I at 8; and STA Letter at 5.

224 See Better Markets Letter II at 4. See also Fidelity Letter at 12; Themis Letter at 6; Ontario Teacher et al. Letter at 2; and Harris Letter at 7.

small as $0.001 goes well beyond what is necessary, and would also be cost prohibitive and complicated to implement."[225] One commenter questioned the impact of smaller increments on Rule 611 of Regulation NMS and recommended that if the Commission "proceed[ed] with their sub-penny quoting proposal. . . .", it should consider amending Rule 611 to include all displayed depth of book quotes.[226]

After considering the comments and analyzing data,[227] the Commission is amending Rule 612 to only add one new minimum pricing increment of $0.005 for those NMS stocks that have a TWAQS of $0.015 or less, rather than also adopting the additional two $0.002 and $0.001 pricing increments as proposed. The Commission's basis for the new minimum pricing increment of $0.005 is rooted by the current midpoint increment when the NBBO is at its narrowest (or smallest) spread. The midpoint increment of the current $0.01 minimum quoting spread is calculated as (NBB plus NBO) divided by 2, and when the spread is at its narrowest, the midpoint increment is equal to $0.005. For example, if the NBB is 10.01 and the NBO is 10.02, the midpoint would be 10.015 ((10.01+10.02)/2) =10.015). Further, the new minimum quoting increment is at a price level familiar to all market participants and is already programmed into many computer systems. This modified approach addresses the concerns raised by commenters related to the proposed $0.002 and $0.001 minimum pricing increments. The adopted amendments also address commenters' concerns about complexity and potentially

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225 See TradeStation Letter at 6.

226 See Themis Letter at 5. As discussed, the Commission is adopting a modified amendment to Rule 612 to introduce only a $0.005 minimum pricing increment for certain NMS stocks, not the smaller proposed increments of $0.002 and $0.001. Therefore, the commenter's recommendation is no longer germane because without the proposed smaller $0.002 and $0.001 increments, the liquidity would not be as dispersed throughout the depth of the book which would not necessitate protection of the full depth of the book.

227 See infra section VII.D.1.

advantaging certain types of market participants by reducing the number of new increments and the universe of NMS stocks that may be eligible for a smaller minimum pricing increment. The adopted $0.005 minimum pricing increment for those NMS stocks that have a TWAQS of $0.015 will address the immediate concerns about the constraints that have developed in the national market system as a result of preexisting Rule 612.

4. Comments on Small- and Mid-Sized Stocks

A few commenters stated that the proposal to reduce minimum pricing increments did not consider the impact on small and mid-sized stocks. [228] One commenter opposed the Regulation NMS Proposal because of concerns that it did not "address the needs and possible unintended consequences for small and mid-sized stocks" and that the Commission should "not take any action until such time as a pilot has been launched and its effects studied and verified by a committee of market participants and academics."[229] Another commenter stated that the proposed tick sizes were "too granular" for small to mid-sized stocks and would result in fewer liquidity providers.[230]

The assignment of the smaller minimum pricing increment is not based on market capitalization because the economics of being tick-constrained do not depend on market capitalization. Rather, whether a stock is experiencing constraint depends on its spread. In other words, since a stock's spread relative to the tick size does not depend on whether it has a small or mid-sized market capitalization, such a stock could still trade with a quoted spread constrained by $0.01 minimum pricing increment. With respect to implementing a pilot program to assess the

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228 See BIO Letter at 1-2, 3 and STA Letter at 5.

229 See BIO Letter at 1-2, 3.

230 See STA Letter at 5.

needs and potential consequences of the proposal for small and mid-sized stocks, the Commission previously conducted a tick size pilot program for small- and mid-sized stocks to assess the impact of wider minimum quoting and trading increments.[231] The Commission analyzed data from that pilot program for purposes of the amendments.[232] Another pilot program is not necessary because the Commission and market participants have demonstrated with data the issues related to tick constraints that have increased since the preexisting rule was adopted.[233] Further, the modified amendment will not introduce increments that are "too granular" for any NMS stock; only those NMS stocks that have a TWAQS of $0.015 or less will be assigned the new $0.005 increment, or three ticks or fewer within the spread. These NMS stocks are constrained by the preexisting increment and the amendment will alleviate this regulatory constraint to allow competitive forces of supply and demand to better establish bid and ask prices.[234]

5. Comments on Market Resiliency

A few commenters raised concerns related to market resiliency risks.[235] The commenter stated that "[b]ecause the Commission's proposal would increase the number of ticks inside the weighted average spread for many stocks, we could expect a significant increase in message traffic that would result from the Commission's proposal."[236] The commenter asked the

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231 See Proposing Release, supra note 11, at 80272-73 for a discussion of the tick size pilot program. See also Tick Sizes and Market Quality: Revisiting the Tick Size Pilot by Yashar H. Barardehi, Peter Dixon, Qiyu Liu, and Ariel Lohr, available at https://www.sec.gov/dera/staff-papers/working-papers/dera_wp_tick-sizes-and-market-qualityrevisiting-tick-size-pilot.

232 See infra section VII.D.1.

233 See infra section VII.D.1.b.ii.

234 See also infra section VII.D.1.b.i and VII.B.2 for additional discussion.

235 See, e.g., Letter from Howard Meyerson, Managing Director, Financial Information Forum, dated Mar. 31, 2023 ("FIF Letter") at 6; and Goldman Sachs Letter at 8.

236 See FIF Letter at 7.

Commission to consider the potential increased message traffic that could result from the proposed minimum pricing increments and stated that the proposal would result in a significant increase in message traffic.[237] The commenter recommended the Commission take a measured and phased approach for reducing the minimum pricing increment for quoting to apply the minimum quoting increment initially to a limited number of stocks and additional groups of stocks in subsequent phases, with review of market resiliency during each phase.

The amendments modifying Rule 612 will result in less message traffic, fewer systems changes and lower costs related to updating ticks for NMS stocks compared to the original proposal and therefore there should pose less of a concern related to market resiliency. The modified amendment adopts a single sub-penny increment that impacts a smaller universe of NMS stocks compared to the proposal, which included three sub-penny increments that would have impacted more NMS stocks. The need for a phased approach is significantly reduced because fewer NMS stocks will be impacted by the one additional minimum quoting increment, and there will be fewer ticks between the spread.

The commenter stated that the potential costs to industry members from increased message traffic would include purchasing additional computer hardware such as servers and that the costs would also apply to production, backup, test, and development environments.[238] The commenter stated that the actual costs would be multiples of the estimated costs from the proposal. However, the adopted amendment to Rule 612 will result in less message traffic than the proposal because it has fewer quoting increments. Consequently, the modified amendments

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237 See FIF Letter at 7. See also Robinhood Letter at 41; Morgan Stanley Letter at 3; UBS Letter at 12; Citigroup Letter at 4; TradeStation Letter at 7; and Goldman Sachs Letter at 9.

238 See FIF Letter at 9. See also Citigroup Letter at 2. See infra section VII.D.5.a.

that are being adopted will reduce computer hardware and developmental costs for the industry compared to the proposal. In the Proposing Release, the Commission considered the message traffic of the options markets, and the systems for the options markets that handle many times more messages compared to (1) the current NMS stock market or (2) the estimated additional message traffic from the adopted amendments.[239] One commenter submitted data that supported this conclusion.[240]

The commenter also raised concerns that increased quote message traffic could significantly increase the costs of the operation of the CAT system.[241] The commenter recommended that the Commission estimate the potential increase in message traffic, provide those estimates to CAT LLC, obtain estimates from the CAT LLC of the increased CAT costs that would result from this increased message traffic, and factor the estimated costs into the cost benefit analysis of the proposed minimum pricing increments changes. Another commenter also stated that the Commission failed to consider whether the increase in message traffic will increase the CAT operating budget.[242] The Commission estimates the impact of the adopted amendments on message traffic, and thus on the CAT operating budget in section VII.D.1.c. As

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239 See Proposing Release, supra note 11, at 80279, notes 196 and 197 (stating that in the second quarter of 2011, the average peak message per second for Tapes A and B reported by the CTA/CQ Plan was 1,015,000 and for Tape C reported by the UTP Plan was 408,300 versus 36.4 million reported by the Options Price Reporting Authority ("OPRA")). See also section VII.E.1.

240 See NYSE Letter I at 11-13.

241 See FIF Letter at 10 ("FIF members are concerned that increased message traffic could significantly increase the costs for the operation of the CAT system as increased quote volumes (including increased frequency of quote updates) would increase the number of CAT-reportable events. 100% of these increased CAT costs would be charged to broker-dealers and exchanges. The operating expenses for CAT were $84.5 million for 2020 and $146.5 million for 2021. CAT LLC, the operator of the CAT system, has estimated the total expenditures for CAT for 2022 at $178.9 million. These costs are in excess of the costs that were contemplated in the CAT NMS Plan.").

242 See Citadel Letter II at 5. The commenter added that increased message traffic increases costs for all market participants, including higher fees charged by CAT and the exclusive SIPs. See also Citadel Letter I at 9 and Virtu Letter II at 6-7.

discussed further below, the Commission estimates the increase in CAT costs associated with adopting the additional minimum pricing increment to be approximately $4.1 million per year.[243] The Commission does not believe it is appropriate to delay action on Rule 612 to have CAT LLC engage in its own analysis of the potential costs.

Commenters raised the issue of increased market data volume on competing consolidators, which are not yet in operation.[244] Likewise, the possible costs to potential competing consolidators will be reduced vis-à-vis the proposal. The Commission recognizes that while the costs may be lower than the proposed rule, the adopted rule could nevertheless create increased message traffic than the preexisting rule. It follows that more message traffic could lead to more possible costs for competing consolidators. However, this new message traffic should still be within the operational capacity of the existing computer systems.[245]

One commenter stated that even with the largest potential increases in messages, equity messaging traffic would remain well below that of the options market and that "the increase in messaging activity from adopting finer tick increments is now well within the industry's capability."[246] On the other hand, another commenter stated that a larger number of ticks across a large number of stocks would lead to increased message traffic, which would, in turn, increase data and infrastructure costs and market latency.[247] One commenter added that increased message traffic would lead to increased latency, which would harm market participants by

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243 See infra section VII.D.1.c.

244 See, e.g., Citadel Letter II at 9 ("A material increase in total message traffic increases costs for all market participants, including due to the resulting higher fees charged by industry utilities, such as the [CAT] and the [SIP]") and Virtu Letter II at 6-7 ("The Commission has failed to analyze the impact of the significantly increased volume of market data on competing consolidators.").

245 See infra section VII.D.1.

246 See NYSE Letter II at 11 (stating that OPRA handles many times more messages than the equity markets).

247 See MFA Letter at 11.

disrupting trading strategies and impairing market functionality and liquidity.[248] As stated above, the adopted amendment to Rule 612 is significantly less complex than the proposal and will not result in the larger number of ticks across a large number of stocks as the commenter suggested. The proposal's four minimum tick increment has been simplified to one additional new tick at $0.005, and the proposal's reduction of minimum pricing increments for NMS stocks that had a TWAQS of $0.04 or less has been reduced to those NMS stocks that have a TWAQS equal to or less than $0.015, which results in fewer expected NMS stocks being assigned a smaller minimum pricing increment.[249] These adopted changes may result in significantly less message traffic than under the commenter's assumption on the proposal. While message traffic may increase over today's message traffic, any increase in message traffic will be significantly less than in the options market, and the options market participants have over the years adjusted to increasingly higher message traffic.[250]

6. Comments on Proposed Criteria for Assigning Minimum Pricing Increments

The Commission proposed to measure the TWAQS when determining the appropriate minimum pricing increment for NMS stocks and proposed four ranges of the TWAQS to determine the corresponding minimum pricing increments. The four proposed TWAQS ranges

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248 See Tradeweb Letter at 2-3 ("Even trading platforms with the most advanced technological infrastructure will need to expend considerable amounts of time and resources to prepare the accommodate increased message traffic, since any increase in latency (even at the millisecond level) would disrupt trading strategies, impair market functionality and liquidity, and, ultimately, harm market participants."); see also Virtu Letter II at 6 ("This increase in message traffic…will significantly add to the overall content of market data."). See also NYSE Letter I at 6 and Nasdaq Letter I at 9 ("Securities with too many ticks not only have wider spreads, but they also have more odd lots, and more message traffic, leading to a more fragile NBBO.").

249 See infra section VII.D.1.a.

250 See Options Clearing Corporation Daily Volume report, available at https://www.theocc.com/Market-Data/Market-Data-Reports/Volume-and-Open-Interest/Daily-Volume.

were: (1) equal to or less than $0.008; (2) greater than $0.008 but less than or equal to $0.016; (3) greater than $0.016 but less than or equal to $0.04; and (4) greater than $0.04. Preliminarily, the Commission believed that NMS stocks with a TWAQS of $0.04 or less would have benefited from smaller minimum pricing increments. After considering the comments, the Commission is retaining TWAQS as the measure to determine when an NMS stock will be assigned smaller minimum pricing increment but has modified the threshold to be equal to or less than $0.015.

Many commenters stated that tick-constrained stocks would benefit from smaller minimum pricing increments.[251] Commenters, however, raised concerns about reducing the minimum pricing increment for NMS stocks that were not experiencing tick constraint with the $0.01 minimum pricing increment.[252] One commenter stated that "a reduction in tick sizes for those stocks that are merely near-tick-constrained will not result in meaningful price-improvements and will not be worth the increased risk of diminished liquidity to bids and offers being spread too thinly across too many price points."[253] As adopted, the new $0.005 minimum pricing increment will be assigned to those NMS stocks that have a TWAQS of $0.015 or less. These NMS stocks are experiencing constraint with the $0.01 minimum pricing increment and

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251 See, e.g., Pragma Letter at 6 ("tick-constrained stocks will benefit from smaller tick sizes with narrower spreads."); MEMX Letter; NYSE, Schwab, and Citadel Letter; IEX Letter I at 7; Nasdaq Letter I at 2 ("Nasdaq supports adjusting the minimum pricing increment ("tick size") to better reflect the trading dynamics of Regulation National Market System ("Reg. NMS") securities."); Brandes Letter at 2; Schwab Letter II at 35; and Robinhood Letter at 46.

252 See, e.g., IEX Letter I; Pragma Letter; Invesco Letter; ICI Letter II at 14 (stating that the Commission should not apply sub-penny increments to stocks that are not tick-constrained); ASA Letter ("we strongly oppose the application of a one-half cent tick size to any stock outside of the most liquid (narrower spread) stocks."); Nasdaq Letter I at 14 ("We propose that securities fall into this new $0.005 tick bucket only if they are tick-constrained."); and Cboe Letter II.

253 See Invesco Letter at 3. See also e.g., ICI Letter II (stating that there is no market failure or harm identified for stocks that are not tick-constrained.) and Brandes Letter at 2 (favoring a reduction to $0.005 for those stocks that are experiencing constraint with the $0.01 increment and stating that the proposed reduction in a minimum pricing increment for stocks that had a TWAQS of $0.04 or less was too broad).

will benefit from being able to be quoted in the smaller increment. As adopted, the Commission has modified the amendment so as not to assign the smaller $0.005 increment to those NMS stocks that are not necessarily experiencing constraint with the $0.01 minimum pricing increment.

Some commenters stated that the TWAQS of $0.011 should be used for identifying NMS stocks that are experiencing tick constraint.[254] However, one commenter recommended that NMS stocks that "could easily become tick-constrained" should have their minimum pricing increment reduced.[255] Other commenters offered other recommendations as to the TWAQS threshold for reducing minimum pricing increments, including a TWAQS threshold of $0.02 or less,[256] a TWAQS threshold of $0.016 or less,[257] and a TWAQS threshold of 0.015 or less.[258]

As discussed further below, the Commission is adopting the TWAQS threshold of $0.015 or less in order to identify NMS stocks that will be eligible for the $0.005 minimum pricing increment.[259] This amendment will generally result in these NMS stocks having a bid-ask spread

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254 See, e.g., NYSE Letter I; Vanguard Letter; Cboe Letter I; and Schwab Letter II at 35-36. But see also Invesco Letter at 3 (stating that $0.011 was overly broad and would result in unnecessary tick reductions for stocks that are not tick-constrained.).

255 See, e.g., IEX Letter I at 7 ("IEX agrees with the premise that tick sizes should be reduced for stocks that are currently "tick-constrained" or could easily become tick-constrained because of the current one-cent limitation.").

256 See IEX Letter I at 7, 13 ("We believe that reducing the tick size and applying it to all securities with a TWAQS up to two cents will substantially improve the efficiency of displayed trading . . .").

257 See BMO Capital Letter at 2 and Form Letter Type H, of which 853 comments were received, available at https://www.sec.gov/comments/s7-30-22/s73022.htm.

258 See Pragma Letter at 6 ("While perhaps not conclusive, the lines of evidence from our analysis also suggest that the Proposal's range of 4 to 8 ticks is too many and will force wider spreads and higher trading costs on the market than necessary. This leads to our primary recommendation: stocks should be moved to a smaller tick size only when their average spread is less than 1/5 in the preceding month; and moved to a larger tick size only when their spread is greater than 4 ticks in the preceding month.").

259 See infra section VII.D.1.b for more discussion on TWAQS.

with one to three ticks, which will improve market quality.[260] Data analysis supports that liquidity and market quality will improve if NMS stocks with a TWAQS of $0.015 or less are assigned to the $0.005 minimum pricing increment.[261] Commenters provided analysis and cited studies that suggest that 2 to 4 ticks intra-spread is optimal for trading, which is consistent with the results of the Commission's analysis.[262]

Some commenters agreed that the TWAQS was the appropriate measure for determining the relevant minimum pricing increment.[263] Several commenters stated that as many stocks as possible should be identified as eligible for a smaller tick size.[264] Other commenters suggested that a multi-factor approach be taken in evaluating whether to reduce the minimum pricing increment for certain NMS stocks.[265] Commenters suggested that such factors include average

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260 See infra note 1303 and accompanying text. See also Nasdaq Letter I at 18 (stating that "quoting outside of the optimal 2-3 tick spreads leads to queues for tick-constrained securities and slower price formation for securities with overly-wide spreads.").

261 See infra section VII.D.1.b.

262 See, e.g., Nasdaq Letter I at 8, 18; Pragma Letter at 1; RBC Letter at 3; CCMR Letter at 23; Letter from Eric Swanson, Chief Executive Officer, XTX Markets LLC, dated Mar. 30, 2023 ("XTX Letter") at 4; MMI Letter at 5; and Harris Letter at 7. See also infra notes 1293-1299 and accompanying text.

263 See, e.g., IEX Letter I at 7 ("[w]e agree that TWAQS is a reasonable and appropriate measure to define which securities should be subject to a narrower tick size."); MEMX Letter; and BMO Capital Letter.

264 See, e.g., Form Letter Type K, of which 22 comments were received, available at https://www.sec.gov/comments/s7-30-22/s73022.htm; Anonymous Letter dated Mar. 6, 2023; letter from Victor Piousbox dated Mar. 6, 2023; letter from Jimit Raithatha dated Mar. 7, 2023; letter from Munib Mian dated Mar. 7, 2023; letter from Peter Unum dated Mar. 19, 2023; letter from Anonymous dated Mar. 22, 2023; and letters from Chris and Donna Graves, dated Mar. 26, 2023; Spencer Neukam dated Mar. 26, 2023; Samuel Cressy dated Mar. 24, 2023; and Zaf Khan dated Mar. 24, 2023.

265 See, e.g., Cboe Letter II at 3 ("The most critical step in any tick-size regime reform is first establishing an objective methodology designed to address truly tick-constrained securities. In this regard, we recommend using a multi-factor methodology, such as Cboe's Tick Size Reduction Framework."); Themis Letter at 7 (supporting Cboe's methodology); Cboe, State Street, et al. Letter; Optiver Letter (discussing the European Union's tick regime as considering stock price and liquidity); NYSE Letter I; ICI Letter II at 11 (stating that applying other factors would lessen concerns about an overbroad tick reduction and mitigate concerns about an adverse market outcome); BlackRock Letter at 5 (stating that quoted spread is one-dimensional and does not provide sufficient context for determining the optimal tick size); Citigroup Letter (recommending a new $0.005 quoting increment for the most liquid tick-constrained stocks); T. Rowe Price Letter (stating that a multi-factor approach would allow the Commission to measure whether a tick size is properly calibrated); STA Letter at 6 (recommending that the Commission use a multifactor

quoted size,[266] ratio of average quoted size to average traded size,[267] daily traded volume,[268] queue length,[269] quotes on multiple exchanges,[270] or stock price.[271] One commenter recommended the inclusion of factors such as large quoted displayed size and a relatively high level of liquidity based on average daily trading volume.[272]

One commenter suggested that in addition to the TWAQS, "quote stability" should be measured.[273] According to the commenter, quote stability would be measured by looking at a change in a stock's quote after execution; if the quote widens after an execution, "the quoted liquidity may not be sufficient for the liquidity demanded, suggesting that the quote increment is

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approach); Virtu Letter II at 6 (stating "one must consider many factors, not just quoted spread" and describing methods proposed by Cboe and Nasdaq); NYSE, Schwab, and Citadel Letter at 1 ("We define 'tick-constrained' to mean symbols that have an average quoted spread of 1.1 cents or less and a reasonable amount of available liquidity at the NBBO."); and Cambridge Letter at 6 (stating that securities should have an average quoted spread of 1.1 cents and be "reasonably liquid"). See also SIFMA Letter II at 36 ("SIFMA believes that a more robust analysis is necessary to evaluate the most appropriate tick sizes for purposes of achieving the best balance between available liquidity at the inside quotation versus narrower spreads.").

266 See, e.g., BlackRock Letter at 6 (". . . if material size was present at the National best Bid and Offer ('NBBO') or a significant proportion of executions were occurring at sub-penny prices, this would be a clear indication of fierce order book competition and interest to tighten the spread and trade in smaller increments."); T. Rowe Price Letter; and Citadel Letter I.

267 See, e.g., Cboe Letter II at 3 ("we started with the complete universe of NMS securities, and applied three constraints—quoted spread, quoted-size-to-trade-size ratio, and notional turnover ratio—to arrive at a group of securities that are quantifiably tick-constrained.") and BlackRock Letter.

268 See, e.g., BlackRock Letter at 5 ("BlackRock recommends that in addition to the time weighted quoted spread, the Commission should incorporate other factors for designating tick sizes, such as the average quoted size, ratio of average quoted size to average traded size, daily traded volume, or stock price."); Optiver Letter; T. Rowe Price Letter; and Citadel Letter I.

269 See, e.g., T. Rowe Price Letter at 4 ("Other factors that could be considered include queue length and quoted size at the top of the order book, turnover, and whether the stock is quoted on multiple exchanges.") and Citadel Letter I.

270 See, e.g., T. Rowe Price Letter at 4.

271 See, e.g., BlackRock Letter at 5 and Optiver Letter ("[w]e recommend that the Commission undertake further analysis of the optimal level of tick granularity, leveraging price and volume to define appropriate tick sizes.").

272 See ICI Letter I at 11. See also Cambridge Letter at (stating that minimum pricing increments should be reduced for those stocks that have a TWAQS of $0.011 or less and "are reasonably liquid.") and Citigroup Letter at 4.

273 See, e.g., NYSE Letter I at 3. See also B. Riley Letter.

not actually constraining quoting activity."[274] Another commenter suggested that the Commission consider using "spread leeway," which the commenter defined as equal to the average quoted spread divided by the minimum tick size.[275] The commenter stated that spread leeway could "effectively quantify the extent to which bid-ask spreads are constrained by the minimum tick size."[276] Another commenter suggested that in addition to a TWAQS of $0.011, there should be "balance or near equilibrium of multiple bids and offers at the top of the central order book" as this would "imply that market forces of supply and demand would naturally force the bid/ask spread tighter through market competition."[277] One commenter that recommended a multi-factor approach to identify NMS stocks suggested that in addition to average quoted spread, a high quoted size to traded size ratio and a high average daily notional turnover should be examined when identifying NMS stocks that are tick-constrained.[278] According to the commenter, a high quoted size to traded size ratio is "an objective signal that shows even though there is an abundance of liquidity, the current $0.01 tick constraint disincentivizes investors to cross the spread due to high costs, resulting in a lack of trade executions."[279] Further, the commenter stated that a high average daily notional turnover is "an objective signal because it

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274 Id.

275 See MMI Letter (stating that spread leeway… "quantifies the extent to which bid-ask spreads are constrained by the minimum tick size…is equal to the average quoted spread divided by the minimum tick size. Prior studies have suggested a spread leeway of 3-9 as optimal for tick sizes to be neither too small, nor too large.").

276 Id. at 5.

277 See Invesco Letter at 3.

278 See Cboe Letter I and Cboe Letter II at 3. See also Cboe, State Street, et al. Letter; State Street Letter at 3.

279 See Cboe Letter I at 2.

focuses the tick reduction effort on high turnover securities that would benefit from the ability to be traded in finer increments."[280] Other commenters supported this approach.[281]

After analyzing data to determine whether the suggested additional factors would be helpful in eliminating NMS stocks that could be harmed by a smaller minimum pricing increment,[282] the Commission has concluded that TWAQS is the appropriate measure to determine whether an NMS stock should be eligible for a smaller minimum pricing increment. Specifically, TWAQS provides a transparent and objective basis to determine whether the $0.01 minimum pricing increment results in a quoted spread that is too wide for a particular NMS stock. Other possible factors, such as average quoted size, ratio of average quoted size to average trade size, the average daily traded volume, queue length, quotes on multiple exchanges or stock price, would add unwarranted and additional complexity that would be difficult and costly for market participants to monitor because some of these measures require the purchase of proprietary data. Supplementing TWAQS with quoted size, turnover calculations, quote stability, and the other recommend criteria would similarly add additional complexity and responsibilities to the primary listing exchanges assigned to calculating TWAQS.[283] The additional criteria suggested by commenters are unnecessary because TWAQS is a sufficient, comprehensive and objective way to determine whether NMS stocks are experiencing issues of constraint related to the $0.01 minimum pricing increment for quotes and orders.[284] Specifically, the Commission concluded that harm is unlikely to result if the other data factors suggested by commenters (e.g.,

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280 Id.

281 See, e.g., SIFMA Letter II at 40; Tastytrade Letter at 18; and Themis Letter at 4.

282 See infra section VII.D.1.b.iii. for further discussions of alternative criteria.

283 See Proposing Release, supra note 11, at 80274.

284 See infra section VII.D.1.b.iii.

price, volume, or depth-based criteria) are not included.[285] Accordingly, the Commission is not adopting factors other than the TWAQS to measure which NMS stocks would be assigned a minimum pricing increment of $0.005.

One commenter suggested that issuers should be able to select the minimum pricing increment for the quotes and orders of their stock.[286] The Commission disagrees. Rule 612 is an important rule under Regulation NMS and serves to link the markets within the national market system by establishing uniform minimum pricing increments for all NMS stocks. This important linkage function would be undermined by allowing increments to be individually assigned to each NMS stock in a non-uniform manner. Rule 612, as originally adopted and as amended, standardizes minimum pricing increments based on transparent and objective criteria in order to ensure that minimum pricing increments are applied uniformly. Introducing issuer choice would eliminate such standardization and enable individual issuers to choose different minimum pricing increments based on their specific, unique individual preferences which would likely result in random and inconsistent application of increments across NMS stocks that otherwise share several relevant trading characteristics. Minimum pricing increment for quotes and orders of NMS stocks priced greater than, or equal to, $1.00 per share based on unpredictable, opaque, non-standard criteria of individual issuers would result in unnecessary complication, such as varied minimum quoting increments and investor confusion, to the national market system. Further, market participants would likely incur additional costs related to, for example, the monitoring and tracking of the minimum pricing increments for issuers.

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285 See infra section VII.D.1.b.iii.

286 See Angel Letter at 5. But see Harris Letter at 8 (opposing suggestions that issuers should choose ticks).

7. Rule 612(a) - Definitions

As adopted, amended Rule 612(a) contains two definitions for purposes of the rule – "Evaluation Period" and "Time Weighted Average Quoted Spread." The primary listing exchanges will use these definitions in identifying the required minimum pricing increments for NMS stocks.

a. Evaluation Period

The Commission proposed to define "Evaluation Period" as the last month of a calendar quarter (March in the first quarter, June in the second quarter, September in the third quarter and December in the fourth quarter) of a calendar year during which the primary listing exchange shall measure the TWAQS of an NMS stock that is priced equal to, or greater than, $1.00 to determine the minimum pricing increment to be in effect for the next calendar quarter, as set forth by proposed paragraph (c). In other words, the minimum pricing increment for quotes and orders would have been evaluated every quarter based on one month's worth of data and could have potentially changed once every quarter.

After considering the comments, the Commission is adopting a revised definition of Evaluation Period. Rule 612(a)(1) defines Evaluation Period as (i) the three months from January through March of a calendar year and (ii) the three months from July through September of a calendar year during which the TWAQS of an NMS stock shall be measured by the primary listing exchange to determine the minimum pricing increment for each NMS stock.

The Commission received comments on the proposed definition of the Evaluation Period.[287] Two commenters generally supported the definition as proposed.[288]

Several commenters stated that one month was too short a period for measuring and calculating TWAQS.[289] One commenter stated that an analysis of one month's data "has the potential to disproportionally weigh systemic and idiosyncratic events (including corporate actions) resulting in unrepresentative tick sizes."[290] Another commenter stated that "longer evaluation periods will reduce the risk that short-term aberrations will have an outsized impact on market structure. Using too short of an evaluation period, especially during periods of heightened volatility, could lead to unrepresentative price variations that ultimately result in illogical minimum price increments."[291] A few commenters recommended providing a longer period for conducting data analysis. Specifically, one commenter suggested that the time frame be "coterminous with the time between tick size changes. In other words, if tick sizes are adjusted every quarter, then the evaluation period should be every quarter . . ."[292] Another

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287 See, e.g., IEX Letter I; Optiver Letter; NYSE Letter I; Pragma Letter; MMI Letter; FIA PTG Letter II; BlackRock Letter; SIFMA Letter II; T. Rowe Price Letter; Cboe Letter I and Cboe Letter II; UBS Letter; and JPMorgan Letter at 4.

288 See, e.g., IEX Letter I and NYSE Letter I (stating that the quarterly updates based on the last month of a quarter's data would "ensure that the next quarter's universe of tick-constrained names is selected using the most recent and relevant basis and allows for monitoring of other securities that are not yet tick-constrained but maybe starting to exhibit tick-constrained behavior."). IEX, however, recommended that the second month of a quarter be used for calculating the TWAQS. See also infra note 305 and accompanying text. See also Harris Letter at 7.

289 See, e.g., Optiver Letter at 2; MMI Letter at 6; FIA PTG Letter II at 2; and UBS Letter at 13. See also Cboe Letter I at 5 (stating that the framework for reevaluating the parameters for revising tick changes according to their proposed methodology should be quarterly or bi-annually so that the parameters "remain nimble to changing market conditions.").

290 See Optiver Letter at 2.

291 See FIA PTG Letter II at 2-3. See also MMI Letter at 6 ("The evaluation period preceding the change should be at least one quarter to avoid capturing instances of market volatility, or events such as stock splits that may indirectly drive trading interest that cause the behavior and characteristics of a stock to depart dramatically from its history.").

292 See FIA PTG Letter II at 2-3.

commenter suggested that the Evaluation Period should be at least one quarter.[293] Another commenter recommended that the Evaluation Period be performed on an annual basis so as to reduce costs and operational risks that may be created by needing to update relevant systems.[294] Finally, one commenter suggested that the evaluation of NMS stocks be conducted on a semi-annual basis, based on six-months of data, to reduce variability and complexity.[295]

A few commenters provided suggestions as to the length of time between tick adjustments.[296] One commenter stated that ticks should be adjusted on a monthly basis rather than a quarterly basis.[297] The commenter stated "[w]e would expect more frequent smaller updates to reduce how often and how long a stock's tick stays outside the optimal range."[298] Another commenter, however, suggested that the Commission align tick adjustments with other elements in the proposal. Specifically, this commenter recommended that "the Commission reduce the frequency of changes and synchronize the intervals for revising market structure parameters by updating both round lots and tick sizes on a quarterly or semi-annual basis."[299] Another commenter suggested an annual consideration as a means to reduce burdens on market participants and reduce operational risks.[300]

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293 See MMI Letter at 6.

294 See UBS Letter at 13.

295 See JPMorgan Letter at 4.

296 See Pragma Letter; UBS Letter; and BlackRock Letter. See also SIFMA Letter II.

297 See Pragma Letter at 1.

298 See id.

299 See BlackRock Letter at 10. See also SIFMA Letter II (commenting on three different elements – ticks, access fee caps and round lots – that would have to be updated and stating "[b]roker-dealers will be required under the Tick Size Proposal to update their systems to appropriately account for all three of these variable changes, which carries inherent risks (and costs) of inadvertent errors relative to today's environment where each of these variables are static."). See also section V.B.3.b.iii for a discussion of the modifications to the round lot definition.

300 See UBS Letter at 12.

After considering the comments on the length of the Evaluation Period, the amended rule will require that the TWAQS be measured over a longer period of time than proposed, i.e., using three months' worth of trading data instead of one month, and minimum pricing increments will be assigned on a less frequent basis, i.e., every six months instead of every three months. The Commission conducted analysis to evaluate the length of the data analysis for the TWAQS and the length of time between minimum pricing increment assignments.[301] This revised definition balances the concerns raised by commenters that a TWAQS measured over too short a time frame could potentially be skewed by high volatility or unique events, such as corporate actions,[302] but that a TWAQs measured over too long of a time period would increase the probability of assigning a stale minimum pricing increment for quotes and orders that does not reflect the prevailing trading characteristics. Further, an annual evaluation would potentially cause some NMS stocks to remain in a sub-optimal minimum pricing increment for too long, while a monthly evaluation of NMS stocks would raise concerns about investor confusion with frequent re-assignments and increase operational risks due to the need for frequent systems updates. The adopted semiannual evaluation addresses the potential burdens and concerns of an Evaluation Period that is either too long or too short.

Finally, two commenters recommended adding an implementation time period between the calculation of the TWAQS and the potential change to an NMS stock's minimum pricing increment.[303] One commenter stated that the proposed rule "leaves little to no time for the

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301 See infra section VII.D.1.d for additional discussion on the three-month period.

302 See supra note 290 and accompanying text. The suggestion that minimum pricing increments be updated on a monthly basis would raise these concerns.

303 See T. Rowe Price Letter and IEX Letter.

industry to communicate the change and update systems to reflect the new tick sizes."[304] Both commenters suggested that the rule should provide one month between the end of the data collection and the effectiveness of any new minimum pricing increments.[305] One commenter stated that one month between the calculation of the TWAQS and the implementation of new tick sizes would "give the industry adequate time to process changes and minimize errors."[306] Another commenter stated that the quarterly changes with short transition time would raise operational risk in the market and at individual firms.[307] This commenter also stated that "[f]requent changes to tick sizes will require considerable investor education."[308] The Commission agrees with commenters' suggestions and is also adopting an implementation period for introducing new minimum pricing increments after an Evaluation Period. As adopted, market participants will have one month to implement any new minimum pricing increments. This will reduce concerns about operational risk and will provide market participants with time to inform investors of any changes in placing orders. One month is an adequate time period for market participants to adapt and make any required systems change to reflect the change, if any, in minimum pricing increment of the quotes and orders of an NMS stock that is priced greater than, or equal to, $1.00 per share. A longer period could partially nullify the objectives of the adopted rule to ameliorate issues related to the constraint of stocks that are quoting at the $0.01 minimum pricing increment.

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304 See T. Rowe Price Letter at 4.

305 See IEX Letter I at 7 (suggesting that the Commission provide "one month between the end of data collection and the beginning of trading with the reallocated tick sizes, in order to avoid any unanticipated disruptions.") and T. Rowe Price Letter.

306 See T. Rowe Price Letter at 4.

307 See Fidelity Letter at 13.

308 See Fidelity Letter at 13. See also Harris Letter at 7 (recommending mechanisms to ensure traders can determine relevant ticks).

As discussed below, the Commission has aligned the semiannual evaluation and implementation of minimum pricing increments and the dates for implementing any minimum pricing increments with the timing for changes to NMS stocks round lot assignment.[309] The Commission agrees with commenters who recommended that these two evaluations and updates be conducted at the same time. This will lessen the burdens on the primary listing exchanges and market participants of implementing new minimum pricing increments and round lots. Further, it will lessen operational risks associated with frequent system updates.

Rule 612(a)(1) also requires that the TWAQS be measured for all NMS stocks by the primary listing exchange. One commenter requested clarification as to what would occur in volatile situations "where a low-priced stock (e.g., sub $1.00) suddenly jumps to a higher price (e.g., $8.00)."[310] This situation could occur under preexisting Rule 612 as the relevant minimum pricing increment is based on the price of the order or quote. However, because orders in an NMS stock can be submitted with prices at or above $1.00 and below $1.00 depending on its current market price, under the amended rule, each NMS stock must have its TWAQS measured so that a minimum pricing increment will be assigned for those orders that are priced at or above $1.00. Therefore, as amended, all NMS stocks will be assigned a minimum pricing increment based on its TWAQS and investors will be able to understand the relevant minimum pricing increment for their orders when priced at or over $1.00 and when priced under $1.00. Under the rule, as adopted, quotes and orders in NMS stocks that are priced less than $1.00 will continue to have a minimum pricing increment of $0.0001.[311] The operation of the amended rule is

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309 See also infra section V.B.3.b.iv.

310 See SIFMA Letter I at 43.

311 See Rule 612(b)(3).

consistent with how the preexisting rule operates in that quotes and orders for a particular NMS stock may be required to be priced in a $0.01 or $0.005 increment when the price of an order is equal to or greater than $1.00 and may also be priced in a $0.0001 increment when the price of an order is less than $1.00.

b. Time Weighted Average Quoted Spread

The Commission proposed to define TWAQS as the average dollar value difference between the NBB and NBO during regular trading hours where each instance of a unique NBB and a unique NBO is weighted by the length of time that the quote prevailed as the NBB or NBO. The Commission did not receive any comments on the definition of TWAQS.[312] The definition in Rule 612(a)(2) is adopted as proposed.

8. Rule 612(b)(1) – Semiannual Operative Dates

Rule 612, as adopted, contains amended paragraph (b)(1), which defines the operative dates for the minimum pricing increments assigned to each NMS stock and provides a month-long time period to implement potentially new minimum pricing increments at the end of each Evaluation Period. Specifically, minimum pricing increments for quotes and orders will be operative on the first business day of May following the Evaluation Period from January through March and the first business day of November following the Evaluation Period from July through September.[313] In adopting these operative dates, the Commission seeks to reduce the risk that market participants may not be fully staffed during the time that technology changes are necessary to implement new minimum pricing increments. Further, in addition to providing

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312 As discussed above, the Commission received comment on whether there should be factors in addition to the TWAQS for determining whether an NMS stock is tick-constrained. See supra section III.C.6.

313 See supra section III.C.7.a, for a discussion of the adopted Evaluation Period.

market participants with adequate time to make necessary systems changes, the implementation period will also provide adequate time for investors to be notified about the minimum pricing increment for the quotes and orders of NMS stocks that are priced equal to or greater than $1.00.[314]

Two commenters requested clarification as to how stock splits would be handled.[315] Once assigned under Rule 612(b)(1), minimum pricing increments will remain operative until the next operative date (i.e., May or November). Therefore, a stock split will not impact an NMS stock's minimum pricing increment until the next cycle. In order to avoid the complexity and confusion that could occur if the minimum pricing increment of NMS stocks were reassigned at unpredictable times, minimum pricing increments will not be changed during the time between operative dates.

9. Rule 612(c) - New NMS Stocks

Commenters asked for clarification on how new NMS stocks would be handled under Rule 612.[316] One commenter questioned how new NMS stocks and IPOs would be assigned minimum pricing increments and stated that allowing exchanges to assign different initial tick sizes could lead to "arbitrage of issuers choosing the exchange that offers the most favorable initial tick size."[317] Another commenter stated that "the simplest and most intuitive alternative would be to use specifications which were previously considered to be the standard unit, such as a $0.01 tick size."[318] The Commission agrees. New NMS stocks will be assigned the same initial

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314 See supra note 303 and accompanying text.

315 See SIFMA Letter II at 42 and Virtu Letter II at 20.

316 See SIFMA Letter II at 42; BlackRock Letter at 10; Virtu Letter II at 18.

317 See SIFMA Letter II at 42; Virtu Letter II at 18.

318 See BlackRock Letter at 10.

minimum pricing increment under Rule 612(c), which requires all securities that become an NMS stock to be assigned to the minimum pricing increment of $0.01.[319] Thereafter, the TWAQS of the NMS stock will be calculated during the next Evaluation Period to determine which minimum pricing increment will be required under Rule 612(b)(2). Sub-penny increments are limited to quotes and orders priced $1.00 or more for those NMS stocks that have a demonstrated narrow TWAQS during the defined Evaluation Period; new NMS stocks that become eligible for trading during an operative period will not satisfy this requirement. New NMS stocks will have their TWAQS calculated during the next Evaluation Period after they start trading.

10. Rule 600(b)(89) - Regulatory Data

The Commission proposed to amend the definition of regulatory data in Rule 600(b)(78)[320] to require the primary listing exchange for each NMS stock to calculate and provide to competing consolidators, self-aggregators, and the exclusive SIPs an indicator of the applicable minimum pricing increment required under Rule 612. The Commission is adopting the minimum pricing increment indicator, as proposed, under the definition of regulatory data in Rule 600(b)(89)(i)(F). A minimum pricing increment indicator will be useful to market participants, including investors, by providing important information about the relevant minimum pricing increment for each NMS stock. This indicator will help market participants, including investors, with submitting orders in the relevant increment. Because the minimum pricing increment can change on a semiannual basis depending on the TWAQS on an NMS

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319 See also section V.B.3.b.iii.

320 Preexisting Rule 600(b)(78) was subsequently renumbered to Rule 600(b)(89) by the Rule 605 Amendments. See Rule 605 Amendments, supra note 10.

stock, this indicator will enable market participants to trade in a more informed manner. The indicator will be included in SIP data that is disseminated by the exclusive SIPs and consolidated market data[321] disseminated by competing consolidators, which will help to ensure the wide availability of information about the applicable minimum pricing increment for each NMS stock.

One commenter supported the minimum pricing increment indicator stating that it would make the new increments easier to implement.[322] This commenter suggested that the exclusive SIPs publish the indicator every morning, in a machine-readable format, and free of charge.[323]

The exclusive SIPs currently provide certain information that comprises regulatory data as part of SIP data.[324] Under the rule, the exclusive SIPs will be required to collect and disseminate a new regulatory data element, the minimum pricing increment indicator, and collect and disseminate this regulatory data element as part of SIP data.[325] To the extent that the exclusive SIPs charge fees for this new regulatory data element, such fees will be required to be filed under rule 608 of Regulation NMS and must be fair and reasonable and not unreasonably discriminatory.[326] The Commission has not required a specific format for SIP data, including regulatory data; such format will be developed by the Operating Committees' for the Equity Data Plans consistent with regulatory requirements.[327]

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321 See rule 600(b)(24).

322 See MMI Letter at 6.

323 See MMI Letter at 6.

324 See MDI Adopting Release, supra note 10, at 18729 for a description of the regulatory messages that are disseminated by the exclusive SIPs.

325 See Rule 600(b)(89)(iv).

326 Sections 11A(c)(1)(C) and 11A(c)(1)(D) and Rule 603(a). See MDI Adopting Release, supra note 10, at 18684.

327 The SIP data format will be available at the SIP's web site, https://www.ctaplan.com/index.

D. Minimum Pricing Increment for Trades

The Commission proposed to amend Rule 612 to introduce minimum pricing increments for trades of NMS stocks where the minimum pricing increment for trading NMS stocks priced at or above $1.00 would vary and correlate to one of the four proposed minimum pricing increments for quoting (i.e., $0.001, $0.002, $0.005 and $0.01), subject to proposed exceptions for midpoint trades and benchmark trades.[328] The proposed minimum pricing increments for trades would have harmonized trading increments (1) with the proposed variable minimum pricing increments for quotes and orders (in this release, "Quote and Trade Harmonization"), and (2) across all trading venues (in this release, "Venue Harmonization"). Specifically, Quote and Trade Harmonization would have required all trading to occur in the same increments as those required of quotes and orders subject to certain exceptions for midpoint and benchmark trades. Venue Harmonization would have required all trading on exchanges, ATSs and OTC to occur in the same pricing increments.

In the Proposing Release,[329] the Commission stated that it was concerned about the competitive dynamic between exchanges, ATSs, and OTC markets and that a potential contributing factor was the ability of OTC market makers to execute orders in price increments that are smaller than the price increments that exchanges and ATSs can practically provide.[330] The Commission stated that applying the minimum pricing increment to trades across all venues would promote equal regulation and fair competition among market participants such as

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328 The Commission also proposed to impose a minimum pricing increment for trades for quotes and orders priced less than $1.00 that would have been the same as the minimum pricing increment for quotes, i.e., $0.0001. See Proposing Release, supra note 11, at 80283.

329 See Proposing Release, supra note 11, at 80268-69.

330 See Proposing Release, supra note 11, at 80283.

exchanges, OTC market makers and ATSs, particularly as it relates to retail order flow;[331] and that it was "reasonable to assume that … [applying] a minimum pricing increment to trades …, could result in greater competition between exchanges and ATSs with other OTC market makers, including wholesalers…"[332] However, the Commission also stated that it could not anticipate how OTC market makers would adjust to increased competitive pressure and whether a market-wide trading increment would yield a "positive, negative or neutral" net effect on retail price improvement.[333]

The Commission received several comments on the proposal to establish minimum pricing increments for trades, including comments related to Quote and Trade Harmonization,[334] Venue Harmonization,[335] statutory authority,[336] rationale,[337] impact on price improvement,[338]

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331 See Proposing Release, supra note 11, at 80283.

332 See Proposing Release, supra note 11, at 80303.

333 See Proposing Release, supra note 11, at 80326.

334 See, e.g., Nasdaq Letter I at 17; Citadel Letter I at 31; State Street Letter at 4; Citigroup Letter at 5; MFA Letter at 7, Letter from Nandini Sukumar, Chief Executive Officer, World Federation of Exchanges, dated Mar. 30, 2023 ("World Federation of Exchanges Letter") at 5, STA Letter at 7, NYSE Letter I at 6; Nasdaq Letter I at 17, NYSE, Schwab, and Citadel Letter at 2, Brandes Letter at 2; Schwab Letter II at 6, Cambridge Letter at 6; B. Riley Letter at 1, Vanguard Letter at 5, Robinhood Letter at 40, 55; JPMorgan Letter at 6.

335 See, e.g., Cboe Letter II at 9, IEX Letter I at 2, Nasdaq Letter I at 2, Citigroup Letter at 5, Pragma Letter at 1, Luke Peterson Letter; Chris Miller Letter, Amanda Kappes Letter.

336 See Citadel Letter I at 4 and Robinhood Letter at 28.

337 See Citigroup Letter at 5, Nasdaq Letter I at 16, World Federation of Exchanges Letter at 4, Better Markets Letter I at 13, Vanguard Letter at 4, IEX Letter III at 5, Drew Ferguson Letter at 1, Max Garrison Letter at 1, Lukas Boller Letter at 1, Trent Miller Letter at 1, Phillip Worts Letter at 1, James Letter at 1, Andrew Garley Letter at 1, Larry Douglas Letter at 1, Steve Sullivan Letter at 1, Luke Czarnota Letter at 1, Charles S Letter at 1, Melisa Virginillo Letter at 1, Melissa Hyer Letter at 1, Keagan Wethington Letter at 1, DH Letter at 1, Alex Riley Letter at 1, Trevor Capestany at 1, Marco Daeblitz at 1, Steven Sullivan Letter at 1. See also Patrick Sexton, EVP, General Counsel & Corporate Secretary, Cboe Global Markets, Inc., dated Aug. 23, 2023 ("Cboe Letter III") at 9.

338 See, e.g., SIFMA Letter II at 4, Citigroup Letter at 5, TradeStation Letter at 6, CCMR Letter at 27, Virtu Letter II at 7, Fidelity Letter at 13, BlackRock Letter at 9, Robinhood Letter at 20, JPMorgan Letter at 6, Morgan Stanley Letter at 4, TastyTrade Letter at 20 and Nasdaq Letter I at 18.

exceptions to minimum pricing increment for trades,[339] and exchange RLP programs.[340] After considering comments and in light of changes from the proposal that the Commission is making to amended Rule 612, the Commission has decided, consistent with one of the Reasonable Alternatives set forth in the Proposing Release,[341] not to adopt a minimum pricing increment for trades. As described above, the Commission is amending Rule 612 to adopt one smaller minimum pricing increment for quotes and orders that primarily focuses on those NMS stocks that are experiencing constraint with the $0.01 minimum pricing increment. A secondary impact of the changes to the minimum quoting increment should be that it helps to partially address the concerns related to fair competition between exchanges, ATSs, and OTC markets that proposing a market-wide trading increment was designed to address.

Amended Rule 612 will reduce the minimum pricing increment for quotes and orders to $0.005 for certain NMS stocks that are priced equal to, or greater than, $1.00 per share which in turn also effectively reduces the increment that such stocks are able to trade in. Under amended Rule 612, OTC markets will continue to be able to trade more readily in comparatively smaller increments (e.g., $0.001 or $0.0001) than exchanges and ATSs, however, exchanges and ATSs will now be able to trade more regularly at smaller increments (i.e., $0.005 or $0.0025), compared to preexisting Rule 612, for those NMS stocks that are assigned the $0.005 minimum pricing increment. By effectively reducing the trading increment for such NMS stocks, which represent a significant amount of the daily trading volume (approximately 58%) and dollar

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339 See, e.g., JPMorgan Letter at 5; ICI Letter I at 17-18, Vanguard Letter at 5; IEX Letter I at 17 and BlackRock Letter at 9.

340 See, e.g., Cboe Letter III at 10-11, IEX Letter I at 17-18, JPMorgan Letter at 6, Ontario Teachers et al. Letter at 2, NYSE Letter I at 6.

341 See Proposing Release, supra note 11, at 80339.

volume (approximately 43%),[342] the potential trade pricing discrepancy between exchanges, ATSs and OTC markets, while not harmonized, will be reduced. Market participants will be able to better compete based on the pricing of quotes and orders. Thus, because reducing the minimum quoting increment for a significant amount of volume of NMS stocks, whether measured by trading or dollars, also effectively reduces the trading increments for those stocks, the concerns related to the ability of OTC market makers to trade in comparatively finer increments raised by the Commission in the Proposing Release will be partially addressed so that the Commission has determined not to adopt the minimum pricing increment for trading.

However, because the amendment to Rule 612 only partially addresses the competitive dynamic between OTC market makers and exchanges and ATSs described in the Proposing Release, and furthermore allows OTC market makers to continue to execute trades in comparatively finer increments, the Commission staff will continue to monitor sub-penny trading to evaluate whether further action is appropriate for the protection of investors and to assure "fair competition among brokers and dealers, among exchange markets, and between exchange markets and markets other than exchange markets" in the national market system.

The Commission's simplified, incremental approach to amending Rule 612 focuses on addressing issues that have developed regarding quoting constraints for certain NMS stocks because of the $0.01 minimum pricing increment. Further, the amendment to Rule 612 will facilitate the transition of market participants and investors to the new tick size regime and the wider use of sub-penny quoting. The amendment, as adopted, also reduces the anticipated implementation costs compared to the proposed amendments to Rule 612. Finally, under

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342 See infra section VII.D.1.a.

amended Rule 612: (1) RLPs[343] that operate pursuant to Commission exemptions that either permit certain quoting and trading in increments of $0.001,[344] or aggregate order flow at the midpoint,[345] will be able to continue to operate without interruption and without changes to exchange rules or the grant of further exemptive relief by the Commission; (2) sub-penny price improvement will continue to be permitted consistent with the requirements of the rule; (3) and investors will continue to be able to manage their order flow and implement trading strategies through the use of midpoint orders and benchmark trades.

IV. Final Rule 610 of Regulation NMS - Fees for Access to Quotations

The Commission is adopting amendments to Rule 610(c)(1)(ii) as proposed with technical modifications to remove the reference to the minimum pricing increment. The Commission is not adopting proposed Rule 610(c)(1)(i) because it is unnecessary.[346] Further, the Commission is adopting amendments to Rule 610(c)(2) as proposed with modifications to align the access fee caps for protected quotations in NMS stocks priced below $1.00 and those priced $1.00 and above.[347] Finally, the Commission is removing outdated references to the "The Nasdaq Stock Market, Inc." in Rule 610(c), as proposed, because the Nasdaq Stock Market is now a national securities exchange and the language is redundant.[348]

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343 See supra note 146.

344 See, e.g., NYSE Rule 7.44 and BX Rule 4780.

345 See, e.g., NYSE Arca Rule 7.44-E and IEX Rule 11.232.

346 The Commission is not adopting the proposed 5 mils access fee cap because it is not adopting the $0.001 minimum pricing increment. As proposed, all protected quotes in NMS stocks priced $1.00 or more that would have been assigned a minimum pricing increment other than $0.001 would have been subject to the proposed 10 mils access fee cap. The Commission is adopting this same model – all protected quotes in NMS stocks priced $1.00 or more will be subject to the 10 mils access fee cap.

347 See infra section VII.D.2.a.

348 See Proposing Release, supra note 11, at 80292.

Specifically, under Rule 610(c), as amended, a trading center[349] will not be permitted to impose, or permit to be imposed, any fee or fees for the execution of an order against a protected quotation of the trading center or against any other quotation of the trading center that is the best bid or best offer of a national securities exchange or the best bid or best offer of a national securities association in an NMS stock that exceed or accumulate to more than $0.001 per share if the price of the protected quotation or other quotation is $1.00 or more, and the fee or fees will not be permitted to exceed or accumulate to more than 0.1% of the quotation price per share if the price of the protected quotation or other quotation is less than $1.00.

The Commission is also adopting Rule 610(d) as proposed to require that all exchange fees and rebates be determinable at the time of execution. For the reasons discussed below, these amendments to Rule 610 are appropriate for the modern national market system.

A. Background

Rule 610(c) was adopted in furtherance of the Congressional directives in section 11A of the Exchange Act and was designed to promote fair and non-discriminatory access to quotations displayed in the national market system.[350] Rule 610(c) seeks to ensure the fairness and accuracy of displayed quotations by establishing an outer limit on the cost of accessing such quotations[351] and was designed to help to ensure that orders placed in the national market system reflect the best prices available. The access fee caps are necessary to achieve the purposes of the Exchange Act, including section 11A(c)(1)(B) of the Exchange Act, which authorizes the Commission to

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349 17 CFR 242.600(b)(106).

350 The Commission also stated that by imposing a uniform fee limitation of $ 0.003 per share, Rule 610(c) will promote equal regulation of different types of trading centers. See Regulation NMS Adopting Release, supra note 4, at 37595.

351 See Regulation NMS Adopting Release, supra note 4, at 37502.

adopt rules assuring the fairness and usefulness of quotation information. The Commission has stated that for quotations to be fair and useful, "there must be some limit on the extent to which the true price for those who access quotations can vary from the displayed price."[352]

Rule 610 was adopted at the same time as Rule 611, the Order Protection Rule, which established intermarket protection against trade-throughs[353] for all NMS stocks. Rule 610(c) was designed to preclude trading centers that posted protected quotations from raising their fees in an attempt to take improper advantage of the trade-through protections adopted under Rule 611.[354] The Commission designed the access fee caps to preserve the benefits of the strengthened price protection under Rule 611 and more efficient linkages among trading centers that were developed under Regulation NMS to access protected quotations that could be disrupted if substantial fees were charged.[355] At the time of adoption, the Commission recognized the importance of protecting the best displayed and accessible prices in promoting deep and stable markets that minimize investor costs. In this regard, the Commission stated that Rule 611 would help to minimize investor transaction costs, which is "the hallmark of efficient markets" and a "primary objective of the [national market system]."[356] Rule 610 is an important component in supporting these goals.

Market participants, including investors, need fair and efficient access to the best priced quotations in the national market system. Therefore, Rule 610(c) remains an important part of the

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352 See Regulation NMS Adopting Release, supra note 4, at 37545.

353 A trade-through occurs when a trading center executes an order at a price that is inferior to the price of a protected quotation that is displayed by another trading center. See 17 CFR 242.600(b)(105) for the definition of trade-through under Regulation NMS.

354 See Regulation NMS Adopting Release, supra note 4, at 37544 and 37595.

355 See Regulation NMS Adopting Release, supra note 4, at 37545.

356 See Regulation NMS Adopting Release, supra note 4, at 37498.

national market system to achieve the purposes of the Exchange Act, preserve the benefits of price protection, and help ensure that displayed quotations reflect something close to actual costs incurred for the transaction.[357]

B. Issues Raised in the Existing Market Structure and the Need for the Amendments

The national market system of 2024 is significantly different than the national market system that existed when Regulation NMS was adopted in 2005.[358] Since Regulation NMS was adopted, new trading practices, order types, and routing strategies have developed that did not exist when Rule 610 was adopted.[359] In addition, exchanges have developed complex fee structures that charge the outer limits permitted for accessing protected quotations and use those fees to fund rebates, which have the effect of creating a discrepancy between displayed prices and net prices.[360] Finally, the national market system has seen a proliferation of new exchanges, often within the same exchange group, that implement varied pricing models to attract specific

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357 The access fee caps were calculated based upon the then current fees that were charged by certain trading venues. See Regulation NMS Adopting Release, supra note 4, at 37545 (stating "the $0.003 fee limitation is consistent with current business practices, as very few trading centers currently charge fees that exceed this amount . . . [and those that do] do not account for a large percentage of the trading volume."). At the time the access fee caps were adopted, the minimum pricing increment for quotes and orders priced $1.00 or greater was $0.01 as Rule 612 was adopted at the same time as Rule 610(c).

358 See Proposing Release, supra note 11, at 80289. See also Letter from John Ramsay, Chief Market Policy Officer, Investors Exchange LLC, dated Oct. 19, 2023 ("IEX Letter IV") at 5-10; Nasdaq Letter I at 4.

359 See also Letter from Theodore R. Lazo, Managing Director & Associate General Counsel, SIFMA, to Brent J. Fields, Secretary, Commission, dated Mar. 29, 2017, at 8 (stating exchanges have developed order types primarily designed to avoid paying high fees, market participants implement complex routing strategies (consistent with their best execution obligations) to avoid paying high exchange access fees in favor of lower costs ATSs and the market place has seen a high level of fragmentation "driven by each exchange group's desire to provide a variety of pricing models within the wide pricing range between 0 and 30 mils.") ("SIFMA 2017 Letter").

360 See infra section VII.C.2, note 1107 and accompanying text and note 1457 (showing that the primary reason that access fees remain near 30 mils on most exchanges is to fund rebates) and Panel A of Table 4, infra section VII.C.2.c.

market participants to their markets.[361] The Commission has monitored these developments and engaged extensively with market participants about the impact of the modern fee structures on fair and efficient access to protected quotations as well as the usefulness and accuracy of such quotations.[362]

Market participants have considered and suggested reductions in the access fee caps for many years to address market distortions (as further discussed below)[363] and better reflect evolutions in the market since Regulation NMS was adopted.[364] One commenter stated that

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361 See infra Tables 4 and 5 showing within the large exchange groups multiple exchanges each with different fee and rebate models. See also e.g., SIFMA 2017 Letter, supra note 359 at 8 (stating "the high level of fragmentation . . . is in part driven by each of the exchange group's desire to provide a variety of pricing models within the wide pricing range between 0 and 30 mils.").

362 For example, the EMSAC considered, among other things, whether the access fee cap should be modified. See EMSAC Archives, supra note 4. See also Concept Release on Equity Market Structure, supra note 59.

363 See, e.g., infra notes 371-376 and accompanying text and infra section IV.B.2 and IV.D.

364 See, e.g., Letter from Theodore R. Lazo, Managing Director & Associate General Counsel, SIFMA, to Brent J. Fields, Secretary, Commission, dated May 24, 2018, at 2 (commenting on File No. S7-05-18 "Transaction Fee Pilot for NMS Stocks") (stating "On several occasions, SIFMA has recommended that the Commission reduce the access fee cap to no more than five cents per 100 shares because the cap has not been adjusted to reflect market developments since Regulation NMS was adopted more than a decade ago.") ("SIFMA 2018 Letter"); Goldman 2018 Letter at 1 (stating "a reduction in the Fee Cap from $0.0030 to $0.0010 per share could be supported today [2018] and would be better calibrated with the present-day trading and execution costs, which have decreased substantially since 2005"); SIFMA 2017 Letter, supra note 359, at 3 (stating the Commission should consider "reducing the access fee cap to no more than $0.0005 for all securities" because "[s]ince Reg. NMS was adopted, spreads have narrowed and commissions have decreased, making the existing cap of access fees outsized relative to today's market realities."); Letter from Theodore R. Lazo, Managing Director & Associate General Counsel, SIFMA, to Mary Jo White, Chair, Commission, dated May 24, 2015, at 2-3 (supporting reduction in access fee to "no more than five cents per hundred shares" because access fees are "an outsized element of transaction costs that in turn distorts price discovery and contributes to market complexity, both on- and off-exchange" and further stating "market participants regularly implement complex order routing strategies . . . that divide, route and re-route orders and parts of orders, when possible, to market centers that enable them to avoid paying excessive access fees" and also stating "access fees have increased complexity on exchanges . . . through the proliferation of exchange order types designed to avoid access fees."); Letter from Daniel Keegan, Managing Director, Head of Americas Equities, Citigroup Global Markets Inc. to Elizabeth Murphy, Secretary, Commission, dated Aug. 7, 2014, at 5 ("Citigroup 2014 Letter") (commenting on Concept Release on Equity Market Structure and stating "[t]he SEC should explore the impacts on the overall markets of complex market structure issues such as maker/taker pricing and access fees" and "[a]t a minimum, the cap on access fees should be reduced to below 10 mils"); Letter from Theodore R. Lazo, Director & Associate General Counsel, SIFMA, to Mary Jo White, Chair, Commission, dated Oct. 24, 2014, at 2 (providing "Recommendations for Equity Market Structure Reforms" including "that exchange access fees be significantly reduced, to no more than five cents per 100 shares"); NYT Dealbook OpEd:

"[d]igital innovations and efficiencies since 2005 have undoubtedly reduced the costs of collecting, storing, processing, and transmitting information" and that "despite reduced costs, increased efficiency, and all the new data and computing power available, the access fee cap has remained fixed at an inflated level that reflects the technology capabilities of 2005."[365]

How to Improve Market Structure, Curt Bradbury, Chief Operating Officer, Stephen's Inc. and Kenneth E. Bentsen, Jr., President and CEO, SIFMA (SIFMA Market Structure Task Force Recommendations), dated July 14, 2014 (stating "Access fees charged by exchanges and other venues should be dramatically reduced, if not eliminated. While brokers are legally required to route their orders to the exchange that is quoting the best price – so called 'protected quotes' – the exchanges are permitted to charge relatively high fees for accessing these quotes: currently 30 cents for every 100 shares. These fees have distorted market pricing as they are a significant percentage of overall trading costs and are several times higher than the fees charged by off-exchange venues. As a result, brokers often avoid routing their orders to exchanges. Exchanges also rebate most of their access fee revenue through price structures such as 'maker/taker.' These developments have led to a proliferation of order types designed to avoid access fees and capture rebates, and that proliferation, in turn, adds complexity to the system, requires continuing technology changes and creates potential for market instability. The Securities and Exchange Commission should reduce the current cap on access fees to no more than 5 cents per 100 shares, and indeed should consider eliminating access fees altogether."); Bradley Hope & Scott Patterson, "NYSE Plan Would Revamp Trading," WALL ST. J. (Dec. 17, 2014), available at http://www.wsj.com/articles/intercontinental-exchangeproposing-major-stock-market-overhaul-1418844900 (stating that since 2005, when the fee cap of $0.003 per share was chosen, competitive and technological advancements have led to decreased costs (spreads and commissions), and as a result, access fees have become a larger portion of overall transaction costs); ICE's Six Recommendations for Reforming Markets," WALL ST. J. (Dec. 18, 2014), available at http://blogs.wsj.com/moneybeat/2014/12/18/ices-six-recommendations-for-reformingmarkets/ (recommending reduction in the access fee cap to $0.0005 in conjunction with adoption of a "trade at" rule, "eliminating maker-taker pricing" and stating "[w]ith myriad different make-take and take-make pricing models in existence today, we believe the potential conflicts and complexity that ensue from the maker-taker models outweigh any perceived benefits. We believe there are better options available to incentivize market-makers to maintain two-sided quotes and reduce intraday volatility" including incentive programs that would obligate market makers to provide liquidity); Joe Ratterman, Chief Executive Officer, & Chris Concannon, President, BATS, "Open Letter to U.S. Securities Industry Participants Re: Market Structure Reform Discussion," at 1 (Jan. 6, 2015), available at http://cdn.batstrading.com/resources/newsletters/OpenLetter010615.pdf (stating access fee cap "requires a substantial reduction and restructuring" and further stating the cap "has remained unchanged for far too long and has never been reevaluated for potential market distortions given the substantially altered broker models and reductions in commissions since the implementation of Regulation NMS.").

365 See IEX Letter IV at 8. See also e.g., Letter from Paul M. Russo, Managing Director, Goldman Sachs & Co. LLC, to Brent J. Fields, Secretary, Commission, at 3 (May 24, 2018), available at https://www.sec.gov/comments/s7-05-18/s70518-3711788-162473.pdf ("Goldman 2018 Letter") (commenting on File No. S7-05-18 "Transaction Fee Pilot for NMS Stocks") at 2 (stating in 2018 "In the thirteen years since the Commission adopted the Fee Cap, spreads have considerably narrowed and commission rates have contracted. However, the Fee Cap has remained unadjusted. There is a well-developed, general consensus among market participants that a [30 mil] per share Fee Cap is an outdated benchmark for execution costs in today's trading environment. As a limit, it creates an upper-range that is simply too high and far from representative of true prices in the marketplace.").

1. Amendments to Rule 612

As discussed above, the Commission is adopting a smaller minimum pricing increment of $0.005 for certain NMS stocks. Because the Commission is adopting the smaller $0.005 increment, it is also amending the preexisting access fee caps in Rule 610(c) to prevent introducing new pricing distortions in the market.[366] For protected quotations priced $1.00 or more, the Commission is adopting a 10 mil access fee cap and has decided that this level is appropriate based on several additional considerations, as discussed in the following sections.

2. Exchange Fee Models

The exchange fee structures in the national market system that have developed under Rule 610 are complex and consist of fees charged and rebates paid to market participants. As stated above, exchanges using a "maker-taker" pricing model, pay a rebate to a "maker" or provider of liquidity, which is funded by the fees charged to a "taker" of liquidity.[367] The exchange earns as revenue the difference between the fee paid by the taker and the rebate paid to the provider or maker.[368] For maker-taker exchanges, the amount of the taker fee is limited by

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366 See infra section VII.D.2.a.

367 See SRO fee schedules, which are available on each SRO's website. See also infra section VII.C.2.c, Table 4. This discussion focuses on exchange fees because, currently, exchanges are the only trading centers that display protected quotations. If an ATS or OTC market maker displayed a protected quotation, its fees would be subject to the access fee caps under Rule 610(c).

368 A few exchanges have adopted a "taker-maker" pricing model (also called an inverted model), in which they charge a fee to the provider of liquidity and pay a rebate to the taker of liquidity. See, e.g., Nasdaq BX fee schedule available at http://www.nasdaqtrader.com/trader.aspx?id=bx_pricing (as of Feb. 2024); NYSE National fee schedule available at https://www.nyse.com/publicdocs/nyse/regulation/nyse/NYSE_National_Schedule_of_Fees.pdf (as of Jan. 1, 2024); Cboe BYX fee schedule available at https://www.cboe.com/us/equities/membership/fee_schedule/byx/ (as of Feb. 2024); and Cboe EDGA fee schedule available at https://www.cboe.com/us/equities/membership/fee_schedule/edga/ (as of Feb., 2024). See also infra section VII.C.2.c, Table 4. For taker-maker exchanges, the amount of the maker fee charged to the provider of liquidity is not bounded by the Rule 610(c) access fee cap because such fee is not a charge to access the market's best bid/offer for NMS stocks, but such fees typically are no more than $0.0030.

the access fee caps imposed by Rule 610(c). The Rule 610(c) access fee caps apply to the fees assessed on an incoming order that executes against a resting protected quote, but do not apply to the rebates. However, the Rule 610(c) access fee caps indirectly limit the average amount of the rebates that an exchange offers to about $0.0030 per share in order to maintain net positive transaction revenues. Thus, an exchange may charge higher access fees to fund higher liquidity rebates.[369] Some exchanges state that rebates are necessary in order for them to attract trading volume.[370]

In recent years, a variety of concerns have been stated about the prevailing maker-taker fee model, and particularly the rebates paid by the exchanges. Those include that the fee/rebate models: (1) undermine market transparency since displayed prices do not account for exchange transaction fees or rebates and therefore do not reflect the net economic costs of a trade;[371] (2) serve as a way to effectively quote in sub-penny increments on a net basis when the effect of a maker-taker exchange's sub-penny rebate is taken into account even though the minimum quoting increment is expressed in full pennies;[372] (3) introduce unnecessary market complexity through the proliferation of new exchange order types (and new exchanges) designed solely to

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369 This was one of the concerns the Commission identified when it approved the access fee caps. See Regulation NMS Adopting Release, supra note 4, at 37545. ("[T]he fee limitation is necessary to achieve the purposes of the Exchange Act. Access fees tend to be highest when markets use them to fund substantial rebates to liquidity providers, rather than merely to compensate for agency services.").

370 See, e.g., Letter from Patrick Sexton, EVP, General Counsel & Corporate Secretary, Cboe Global Markets, Inc., dated Apr. 5, 2024 ("Cboe Letter IV") at 2-5; Letter from Brett Kitt, Vice President, Deputy General Counsel, Nasdaq, Inc., dated Mar. 25, 2024 ("Nasdaq Letter IV") at 3-5; Nasdaq Letter III at 2-5.

371 See, e.g., Letter from Richard Steiner, Global Equities Liaison to Regulatory & Government Affairs, RBC Capital Markets, to Elizabeth Murphy, Secretary, Commission, at 2-3 (Nov. 22, 2013), available at https://www.sec.gov/comments/s7-02-10/s70210-411.pdf ("RBC Capital Letter") (commenting on potential equity market structure initiatives).

372 See, e.g., Larry Harris, "Maker-Taker Pricing Effects on Market Quotations," at 24-25 (Nov. 14, 2013).

take advantage of pricing models;[373] (4) drive orders to non-exchange trading centers that do not display quotes as market participants seek to avoid the higher fees that exchanges charge to subsidize the rebates they offer to attract liquidity;[374] and (5) benefit sophisticated market participants like market makers and proprietary traders at the expense of other market participants.[375] Further, the prevailing access fee structure creates potential conflicts of interest for broker-dealers, who must provide the best execution to their customers' orders while facing potentially conflicting economic incentives to avoid fees or earn rebates from the trading centers to which they direct those orders for execution.[376]

a. Transparency

The chart below illustrates with a hypothetical example the Commission's concern that exchange fee/rebate models can undermine price transparency. While some investors may invest

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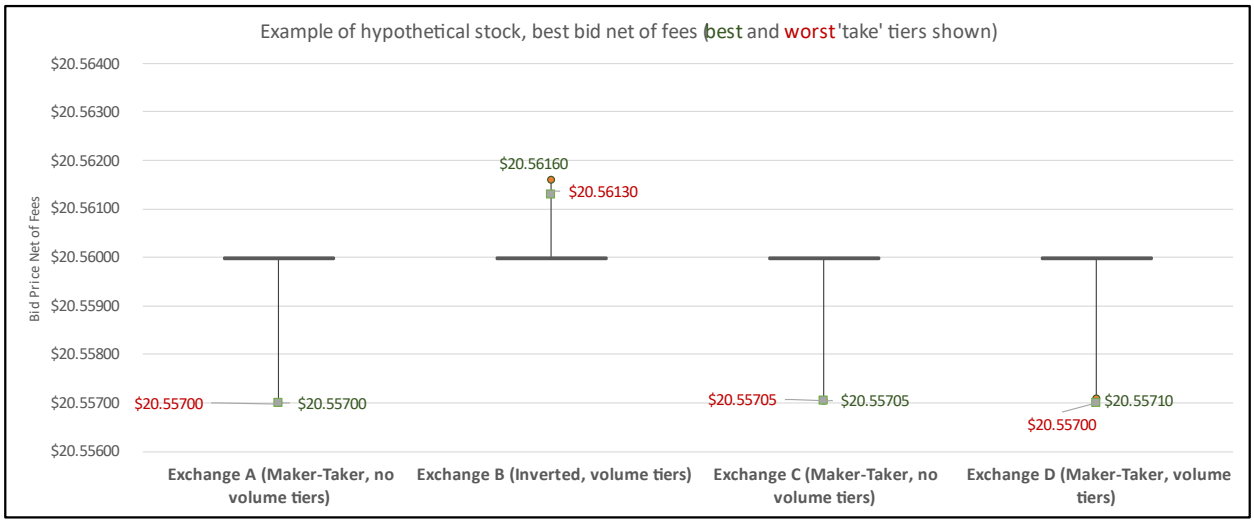
373 See, e.g., Curt Bradbury, Market Structure Task Force Chair, Board of Directors, SIFMA, and Kenneth E. Bentsen Jr., President and Chief Executive Officer, SIFMA, Opinion, "How to Improve Market Structure," N.Y. Times (July 14, 2014), available at http://dealbook.nytimes.com/2014/07/14/how-to-improve-market-structure/?_r=0 (stating that the "proliferation of order types designed to avoid access fees and capture rebates . . . adds complexity to the system, requires continuing technology changes and creates potential for market instability" and recommending access fees charged by exchanges be "dramatically reduced, if not eliminated"); RBC Capital Letter at 2; and Letter from Haim Bodek, Managing Principal and Stanislav Dolgopolov, Regulatory Consultant, Decimus Capital Markets, LLC, dated Apr. 25, 2016, at 3 and 11 ("Decimus 2016 Letter"); Vanguard Letter at 6.

374 See, e.g., Menkveld, Albert J., Bart Zhou Yueshen, and Haoxiang Zhu, "Shades of darkness: A pecking order of trading venues." *Journal of Financial Economics* 124, no. 3 (2017) at 503-534, available at https://www.mit.edu/~zhuh/MenkveldYueshenZhu_2017JFE_dark.pdf; RBC Capital Letter at 2.

375 See, e.g., RBC Capital Letter at 2-4; Letter from Mehmet Kinak, Vice President – Global Head of Systematic Trading & Market Structure, and Jonathan Siegel, Vice President – Senior Legal Counsel (Legislative & Regulatory Affairs), T. Rowe Price, to Brent J. Fields, Secretary, Commission, dated June 12, 2018, at 2, available at https://www.sec.gov/comments/s7-05-18/s70518-3832746-162769.pdf (sec.gov) (commenting on File No. S7-05-18 "Transaction Fee Pilot for NMS Stocks).

376 See, e.g., Stanislav Dolgopolov, "The Maker-Taker Pricing Model and its Impact on the Securities Market Structure: A Can of Worms for Securities Fraud?" 8 VA. L. & BUS. REV. 231, 270 (2014), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2399821 (retrieved from SSRN Elsevier database).

heavily to fully map out the fee schedules, these schedules are complex and thus doing so would be costly, consequently it is likely that not all investors fully map out fee schedules.[377]



The Commission examined data for NMS stocks to demonstrate the price variations that can occur under the exchange fee and rebate schedules. The chart above shows a common scenario for a hypothetical stock, with four exchanges all displaying the same best bid of $20.56. However, due to differing fee schedules, each of the four represents a different net bid to market participants. Furthermore, due to volume-based price fee tiers, some exchanges' net bids differ for different market participants. The fee schedules used to create this example are taken from various exchange fee schedules as of June 2024. Exchange A charges the maximum allowed access fee of 30 mils, and so market participants that trade with the Exchange A bid receive a net price of $20.557 per share ($20.56 minus a $0.003 fee). Exchange B has an inverted "taker-maker" fee schedule and so pays a rebate to participants who remove liquidity, with differing

377 See infra section VII.C.2.c and Table 4 therein for additional analysis and discussion of the complexity of fee and rebate schedules.

rebates based on volume tiers. In this example, a market participant that trades with the bid on Exchange B receives a net price of $20.5616 if in the best tier ($20.56 plus a $0.0016 rebate). Exchange C charges an access fee of 29.5 mils, meaning that a market participant that trades with the Exchange C bid would receive a net price of $20.55705 per share ($20.56 minus the $0.00295 fee). Lastly, Exchange D charges an access fee of 29 mils to those in the best tier, so such a participant trading with Exchange D receives a net price of $20.5571. Despite all four exchanges showing the same bid of $20.56, the bids net of fees vary from a low of $20.557 to a high of $20.5616, a substantial difference of $0.0046 per share (nearly half the current minimum pricing increment).

b. Liquidity and the NBBO

The price of liquidity for investors in terms of buying and then later selling a security is the spread between the best bid and the best offer, which is reflected by the NBBO. For those market participants that provide liquidity, such as market makers, this spread similarly represents the market price for providing those liquidity services at any given point in time. More recently, trading center models that pay rebates to liquidity providers (which rebates are funded on a transaction basis by charging an access fee to the taker of liquidity) pay an additional return to the liquidity provider separate from what would be captured though the spread, which may then lead those liquidity providers to lower the spread (that is, the implicit price for their liquidity provision services) more than they would otherwise.[378] These prices are reflected in the NBBO, which is disseminated in the national market system.

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[378] See also infra section VII.B.3.

Others have stated that the maker-taker model has positive effects by enabling exchanges to compete with non-exchange trading centers and by narrowing quoted spreads through subsidizing posted prices,[379] but these potential benefits should be balanced against the market distortions associated with the fee and rebate models mentioned above.[380] Further, rebates paid to liquidity providers under maker-taker fee schedules may narrow displayed spreads in some securities by subsidizing liquidity providers (i.e., by allowing a maker to post a more aggressive price than it may have in absence of a rebate), and these prices may not reflect the underlying economics for the NMS stock.[381] In turn, that displayed liquidity may establish the NBBO,[382] which is often used as the benchmark for marketable order flow, including retail order flow, that is executed off-exchange by either matching or improving upon those distortive prices.[383] Accordingly, rebates may distort quotation prices that are displayed in the national market system.[384]

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379 See, e.g., Letter from John A. Zecca, Executive Vice President, Global Chief Legal, Risk and Regulatory Officer, Nasdaq, Inc., dated Aug. 9, 2023 ("Nasdaq Letter II") at 5-6; Larry Harris, "Maker-Taker Pricing Effects on Market Quotations," at 5 (Nov. 14, 2013), available at https://en-coller.tau.ac.il/sites/nihul_en.tau.ac.il/files/media_server/Recanati/management/seminars/account/Maker.pdf; Letter from Richie Prager, Managing Director, Head of Trading and Liquidity Strategies, BlackRock, Inc., to Mary Jo White, Chair, SEC, at 2 (Sept. 12, 2014), available at https://www.sec.gov/comments/s7-02-10/s70210-419.pdf; Michael Brolley & Katya Malinova, "Informed Trading and Maker-Taker Fees in a Low Latency Limit Order Market," at 2 (Oct. 24, 2013), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2178102.

380 As discussed throughout, these concerns include, for example, undermining price transparency, introducing unnecessary complexity through the proliferation of new exchange order types and order routing strategies, added market fragmentation, creating or exacerbating potential conflicts of interest between brokers and their customers, and in NMS stocks that are tick constrained, assessing a higher cost to liquidity demanders.

381 See also infra sections VII.B.3 and VII.C.2.

382 See also infra sections VII.B.3 and VII.C.2.

383 See, e.g., Concept Release on Equity Market Structure, supra note 59 (evaluating broadly the performance of market structure since Regulation NMS, particularly for long-term investors and for businesses seeking to raise capital, and soliciting comment on whether regulatory initiatives to improve market structure are needed).

384 See infra section VII.A and infra notes 1733 and 1734 and accompanying text.

High rebates also incentivize excessive intermediation,[385] especially in very liquid securities, to the extent rebates induce or exacerbate an oversupply of liquidity at the best bid or offer.[386] As discussed below, some stocks will trade with a quoted spread one tick wide, whether the tick size is $0.01 or $0.005. In those cases, quoted spread is unable to adjust lower due to the tick size, so the rebate paid to liquidity providers, which is funded by an access fee paid by liquidity takers, acts as a wealth transfer from liquidity takers to liquidity providers. This wealth transfer in turn unnecessarily incentivizes the provision of liquidity (i.e., encourages providing liquidity in order to earn the rebate), thereby creating an environment with too much liquidity supplied relative to liquidity demanded and leading to rebates for faster liquidity suppliers and a higher cost to liquidity takers.[387] In other words, excessive quoting in tick-constrained securities to earn rebates undermines price transparency because displayed prices and the associated size at those prices do not reflect the underlying economics of supply and demand, but rather reflect the impact of fees or rebates.[388]

c. Potential Conflicts of Interest

As more fully discussed below and in the Economic Analysis, access fees and rebates create potential broker-dealer conflicts of interest in order routing, particularly to the extent the fees and rebates are not passed through to the customer.[389] For example, this structure can create an incentive for a broker-dealer that fully absorbs transaction costs or rebates potentially to route customer orders to an exchange in order to avoid fees that are paid by the broker-dealer or to

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385 See infra note 1005.

386 See Proposing Release, supra note 11, at 80292. See also infra note 1005 and accompanying text.

387 See infra section VII.D.2.

388 See infra note 1005 and accompanying text.

389 See infra sections IV.D.1.b and VII.D.2.c. See also Proposing Release, supra note 11, at 80330.

receive the highest rebate paid.[390] Lowering the access fees caps will help alleviate potential conflicts of interest.[391]

d. Market Complexity

Exchange fee and rebate models under preexisting Rule 610(c) have also led to the development of a variety of complex order types, including those that allow market participants to avoid paying access fees or to ensure that rebates are collected.[392] Further, exchange fee and rebate models are another way exchanges differentiate themselves from each other and from other trading centers to attract order flow. The variability of fee and rebate models (often within the same exchange group) introduces additional market complexity and fragmentation because it encourages the creation of new exchanges that offer different pricing structures to attract different types of market participants or trading strategies. Moreover, the drive to establish novel and competitive fee schedules results in frequent fee schedule changes (typically on a monthly basis), which adds uncertainty and complexity to the marketplace because market participants must continually update their routing tables to reflect these price changes.[393] A higher cap allows for a wider range of possible access fees (i.e., $0-$0.0030) and more variability in exchange fees, which introduces additional complexity to the market.[394]

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390 See, e.g., Vanguard Letter at 6.

391 See infra section VII.D.2.d.

392 Examples of such complex order types include post-only orders or add-liquidity only orders that seek to only provide liquidity to gain a rebate and will not upon entry, execute against a resting order on the other side of the market so as to avoid paying a transaction fee. See, e.g., BZX Rule 11.9(c)(6) (defining a BZX Post Only Order); MEMX Rule 11.16(i)(6) (defining Post Only); Nasdaq Equity, Rule 4702(4)(A)(defining a Post-Only Order); NYSE Rule 7.31(e)(2) (defining an ALO Order); NYSE Arca Rule 7.31(e)(2) (defining an ALO Order). See also Staff Report on Algorithmic Trading in the U.S. Capital Markets (Aug. 5, 2020), available at https://www.sec.gov/files/Algo_Trading_Report_2020.pdf.

393 See infra note 1081 and accompanying text.

394 See supra note 361 and infra note 1764.

C. Proposal to Amend 610(c)

To accommodate the amendments to Rule 612 and to address the issues that have developed with the fee schedules for protected quotes under Rule 610(c), the Commission proposed to amend Rule 610(c) by reducing the level of the access fee caps for all protected quotations in NMS stocks. For protected quotations in all NMS stocks priced $1.00 or more, the proposal introduced two lower access fee caps to accommodate the proposed minimum pricing increments under proposed Rule 612 for quotations priced equal to or greater than $1.00 per share.[395] Specifically, for all protected quotations in NMS stocks priced $1.00 or more per share and assigned a proposed minimum pricing increment greater than $0.001, the Commission proposed a 10 mil access fee cap; and for all protected quotations in NMS stocks priced $1.00 or more per share and assigned the proposed $0.001 minimum pricing increment, the Commission proposed a 5 mil access fee cap. For all protected quotations in NMS stocks priced less than $1.00 per share, the Commission proposed to reduce the access fee cap to 0.05% of the quotation price.[396]

The Commission received many comments on the proposed amendments to Rule 610(c). The comments are discussed more fully below.

D. Final Rule 610(c)

The amended access fee caps reflect several considerations by the Commission as well as input from commenters. For protected quotations priced $1.00 or more, the Commission is adopting a 10 mil access fee cap. This level is appropriate based on several considerations. First, because the Commission is adopting the $0.005 increment for certain NMS stocks under

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395 See Proposed Rule 610(c); Proposing Release, supra note 11, at 80269.

396 See Proposed Rule 610(c); Proposing Release, supra note 11, at 80269.

amended Rule 612, it is also reducing the level of the preexisting access fee caps in Rule 610(c) in order to prevent the price distortions that would occur if access fees were able to be set at more than half of the minimum pricing increment (i.e., a protected quotation with an access fee that exceeds half the minimum pricing increment economically would be represented at the next less aggressive pricing increment).[397] A 10 mil access fee cap is sufficiently below the smallest minimum pricing increment (i.e., $0.005) so as to not create new pricing distortions.[398]

Second, in adopting the 10 mil access fee cap, the Commission also considered the impact of the reduction on the agency market business model. A 10 mil access fee cap is at a level that will allow the exchanges to maintain their current net capture for executions of NMS stocks priced $1.00 or greater.[399]

The 10 mil access fee cap also should help to reduce distortions and complexities under the fee structures that have developed under the preexisting access fee caps levels.[400] As discussed above, under the preexisting access fee caps, many exchanges charge access fees at or near the highest permitted levels under preexisting Rule 610(c) as a means to fund rebates.[401] Access fees charged at the highest level permitted under the preexisting rule and the rebates they fund harm price transparency because the displayed price does not accurately reflect the

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397 See Proposing Release, supra note 11, at 80290. See also infra notes 1423 - 1424 accompanying text and sectionVII.D.2.a. As discussed in greater detail below, the amendments to Rule 612 do not include the proposed $0.001 minimum pricing increment, as proposed. Therefore, although the Commission proposed a 5 mil access fee cap to correspond to the $0.001 minimum pricing increment, the 5 mil access fee cap is not necessary because the Commission is not adopting the proposed $0.001 minimum increment. See infra section IV.D.1.a.

398 See infra section VII.D.2.a.

399 See infra sections IV.D.1.c and VII.D.2.b.

400 See infra sections IV.D.1.c. and IV.D.1.d.

401 See Proposing Release, supra note 11, at 80288. See also infra sections IV.D.1.b.and VII.C.2.c, specifically Table 4. While Rule 610(c) limits the fees assessed against an incoming order that executes against a resting protected quote, it does not address the rebates that may be paid.

underlying economics of a decision to post a protected quotation at a particular price (i.e., the market participant's assessment of the price of liquidity for the security is distorted by the subsidy provided by the rebate), or to access a protected quotation at a particular price (i.e., the displayed price does not reflect the additional cost of the access fee).[402] The negative impact on price transparency is exacerbated when various exchanges have different fees and rebates and make frequent updates to those rates, making the comparison of net prices unnecessarily complex and difficult.[403]

Further, reducing the level of the access fee caps to the adopted levels will reduce complexity in the market because it will (1) reduce the incentives to use certain complex order types that are designed to avoid high fees/garner large rebates, (2) potentially reduce the number of fee changes in the market and accompanying frequent changes to complex order routing strategies, and (3) may discourage further market fragmentation.[404] Reducing the amount of rebates by reducing the access fee caps to 10 mils also will reduce the magnitude of potential conflicts of interest in the market.

Finally, in determining to adopt the 10 mil access fee cap, the Commission has considered input from commenters, including market participants. Commenters stated that the reduced 10 mil access fee cap will better reflect current market rates and the increased

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402 See infra section VII.D.2.a.

403 See infra note 1096 and adjacent text and section VII.C.2.c, Table 4 (analyzing fee and rebate schedules and stating the current structure of fees and rebates is complex and constantly changing).

404 See infra section VII.D.2.d.

efficiencies from electronic trading and other market structure changes, all of which have reduced trading costs since Rule 610 was originally adopted.[405]

In addition, the Commission is retaining the uniform access fee cap structure whereby the access fee caps are assigned based solely upon the price of the protected quotation. In other words, the Commission is adopting the 10 mil access fee cap for all protected quotes priced $1.00 or more. Maintaining the preexisting uniform structure of the access fee caps helps ensure that the requirements under Rule 610(c) do not increase the fee structure complexity or introduce unintended consequences (such as oscillations) that would create additional costs for market participants.[406]

Further, the Commission is also reducing the level of the access fee cap for NMS stocks priced under $1.00 to 0.1% of the quotation price in order to maintain the preexisting structure as well as to harmonize that cap with the adopted 10 mils cap for NMS stocks priced at $1.00 or more. The harmonization will prevent different fees on quotes above and below $1.00 that could negatively impact price formation.[407] These considerations are consistent with the analysis and rationale the Commission used when it adopted the access fee caps in 2005.[408]

Lowering the access fee caps to these levels and maintaining the preexisting uniform structure will promote the statutory objectives of fair and efficient access to protected quotes and will help to ensure the fairness and usefulness of protected quotations[409] because the amended

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405 See, e.g., Better Markets Letter I at 16; Brandes Letter at 3; Ontario Teachers et al. Letter at 1-2; IEX Letter IV at 7-8; Verret Letter III at 5-6; Letter from John Ramsay, Chief Market Policy Officer, Investors Exchange LLC, dated Apr. 19, 2024 ("IEX Letter VI") at 4. See also supra IV.D.1 (discussing comment letters).

406 See infra section VII.D.2.d.

407 See infra section VII.D.2.c.

408 See generally, Regulation NMS Adopting Release, supra note 4.

409 Section 11A(c)(1)(B) of the Exchange Act. See Regulation NMS Adopting Release, supra note 4, at 37545.

access fee caps will lead to transaction pricing that is better aligned with today's market dynamics.[410] Recalibrating the level of the caps will yield savings for investors and help to address distortions in the markets while maintaining the ability of the trading centers that display protected quotations to continue to provide execution services, innovate and compete because they will be able to retain the same fees (net of any rebates) for executions that are priced $1.00 or more,[411] notwithstanding the reduction of the fee cap to 10 mils.[412] The Commission has balanced the competing interests of reducing the cap to address the amendments to Rule 612 and market distortions associated with the fee/rebate models that have developed under the preexisting fee caps, with the importance of preserving the viability of multiple agency market business models. The amended 10 mils access fee cap will lead to improved market quality because it will reduce distortions in the market and preserve the integrity of displayed prices, which will support sufficient price discovery, and will reduce costs for investors.[413]

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410 See infra section VII.D.2.b. As discussed below, the level of the adopted access fee cap for protected quotes in NMS stocks priced $1.00 or more is consistent with the current level charged by some trading centers that do not post protected quotes and therefore are not subject to the preexisting access fee caps under Rule 610(c). Specifically, the fees charged by some ATSs for execution services are often in the range of 10 mils for access to their liquidity. See infra note 1118 and accompanying text and infra section VII.C.2. This level reflects a competitive rate for providing access to liquidity, and hence represents a reasonable level for amending the access fee caps for protected quotes. See also e.g., Goldman 2018 Letter at 4 (stating "a reduction of the Fee Cap to $0.0010 per share is reasonable and would be better calibrated with today's market pricing."). According to one commenter, while the "overwhelming proportion of transaction volume executed on national stock exchanges is subject to the maximum access fee of 30 mils . . .volume executed on ATS's and other venues outside of exchanges is typically subject to substantially lower costs of access, in the range of ten mils and lower."). IEX Letter IV at 8.

411 See also infra sections VII.C.2 and VII.D.2, and Table 14. As discussed below, the Commission estimates for purposes of this release that exchange net capture is 2 mils while also recognizing that net capture can range from approximately 2 to 6 mils. See infra note 1103.

412 See infra section IV.D.1.c. See also Proposing Release, supra note 11, at 80290-91.

413 See infra section VII.D.2. See also Proposing Release, supra note 11, at 80292 and at 80309 (stating because "compensation is above what would exist in a competitive market there is an increased incentive to provide liquidity via limit orders, so queues of limit orders tend to be longer, wait times to get a limit order executed also tend to be longer, and, thus the likelihood that the market moves away from an investor's limit order increases, leading to lower overall fill rates for limit orders") and at 80329 (stating "[t]he primary beneficiaries of the reduction in the access fee cap would be liquidity demanders. For stocks with

1. Comments on Proposed Rule 610(c)

Many comments from a broad cross section of market participants supported the need to reduce the access fee caps in preexisting Rule 610(c).[414] Many individual commenters stated that the reduced access fee caps would help to reduce trading costs.[415] One individual commenter stated "[a]s a retail trader, I have experienced the high costs of access fees, which can be a significant portion of my trading costs. The proposed reduction in access fee caps will help to lower my costs, which will allow me to take advantage of more trading opportunities and ultimately benefit from a more efficient market."[416] Other commenters also stated that a reduction in the access fee caps would reduce trading costs for investors.[417]

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narrow spreads such as tick-constrained stocks, a 30 mil access fee can increase the cost of demanding liquidity by as much as 60%. Consequently, reducing the access fee significantly reduces the cost of demanding liquidity in the predominant maker-taker trading environment. This effect coupled with the expected decrease of liquidity suppliers can be expected to decrease competition to provide liquidity. Less competition to provide liquidity means that queue lengths could decrease and fill rates increase because it would be easier to get to the front of the order book. This effect could allow non high frequency traders - more opportunity to fill orders using liquidity-providing instead of liquidity-demanding transactions."). See also IEX Letter IV at 2, 6-8.

414 See, e.g., IEX Letter IV at 1; IEX Letter VI at 1; Better Markets Letter II at 1; We The Investors Letter dated Mar. 30, 2023 at 2; Letters from Chris Robinson, dated Mar. 3, 2023; William Bledsoe, Jr., dated Feb. 28, 2023; Ryan Macarthur, dated Feb. 24, 2023; Julio Tello, dated Feb. 24, 2023; David Genco, Jr., dated Feb. 24, 2023; John, dated Feb. 23, 2023; Citigroup Letter at 3; BlackRock Letter at 10-11; Better Markets Letter I at 16; ASA Letter at 5; Vanguard Letter at 2; Invesco Letter at 2; JPMorgan Letter at 6; Ontario Teachers et al. Letter at 1-2; Budish Letter at 1; Mark Rogers Letter, dated Mar. 30, 2023; Grant Medford Letter, dated Mar. 30, 2023 ; Jared Albert Letter, dated Mar. 28, 2023; Steven Tripari Letter ("Tripari Letter"), dated Mar. 28, 2023; Peter McKornack Letter, dated Mar. 29, 2023; Verret Letter III at 26.

415 See, e.g., Julio Tello, dated Feb. 24, 2023; Ryan Macarthur, dated Feb. 24, 2023; David Genco, Jr., dated Feb. 24, 2023; John, dated Feb. 23, 2023; Budish Letter at 1.

416 Julio Tello, dated Feb. 24, 2023.

417 See, e.g., Ontario Teachers et al. Letter at 2; Brandes Letter at 3; Boston Partners, Calamos Advisors, Glenmede Investment, and Janus Henderson Letter.

Some commenters stated that the proposal would enhance transparency[418] and would reduce complexity.[419] As discussed above, the reduced access fee caps will enhance transparency of protected quotes and reduce complexity in the market by reducing the need for complex order types that have developed to accommodate the fee/rebate models.

Among the commenters that supported a reduction in the access fee caps,[420] several stated that the amendments to Rule 612 to reduce tick sizes would necessitate a reduction in the access fee caps for those securities assigned a smaller tick,[421] while many others stated that the preexisting access fee cap should be lowered to 10 mils per share for protected quotations in all NMS stocks priced at $1.00 or more regardless of whether there was a reduction in tick size.[422] As discussed below, the Commission has decided to maintain the uniform access fee cap structure and continue to apply the caps to all protected quotes based on price. The Commission has decided that reducing the caps for all protected quotes, not just those that may be assigned the smaller $0.005 minimum pricing increment, is appropriate to address the distortions that exist

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418 See, e.g., Grant Medford Letter, dated Mar. 30, 2023; Verret Letter III at 24; BlackRock Letter at 10-11.

419 See, e.g., Budish Letter at 1; Boston Partners, Calamos Advisors, Glenmede Investment, and Janus Henderson Letter.

420 See, e.g., IEX Letter IV at 1; MEMX Letter at 22; Biotechnology Innovation Organization Letter at 1; Brandes Letter at 3; Letter from Allison Bishop, President, Proof Services LLC, dated Mar. 31, 2023 ("Proof Letter") at 1; BlackRock Letter at 10-11; Verret Letter I at 1, 2 and 4; MFA Letter at 13.

421 SIFMA Letter II at 39; Invesco Letter at 4; Nasdaq Letter I at 19; Better Markets Letter II at 3-4.

422 IEX Letter IV at 1; IEX Letter I at 6 and 21; Better Markets Letter I at 16; Better Markets Letter II at 4; Ontario Teachers et al. Letter at 2; Brandes Letter at 3; Boston Partners, Calamos Advisors, Glenmede Investment, and Janus Henderson Letter (supporting Brandes' Letter); Healthy Markets Letter I at 24; Themis Letter at 7-8; Letter from Andrew Hartnett, President and Deputy Commissioner, Iowa Insurance Division, North American Securities Administrators Association, Inc., dated Mar. 31, 2023 ("NASAA Letter") at 1 and 9; ASA Letter at 5; Vanguard Letter at 6; JPMorgan Letter at 6; Capital Group Letter at 4; Pragma Letter at 7; Invesco Letter at 4; Verret Letter I at 8; XTX Letter at 5; Letter from Jeffrey P. Mahoney, General Counsel, Council of Institutional Investors, dated Mar. 30, 2023 ("Council of Institutional Investors Letter") at 3; BMO Letter at 3; and BlackRock Letter at 10-11.

in the national market system. Further, maintaining the uniform structure will help to ensure that the rule does not increase complexity in the national market system.

Several commenters stated that modifications to reflect the significant evolution in market conditions since the caps were established almost two decades ago are long overdue.[423] One commenter stated that the current access fee caps are "antiquated."[424] Another commenter stated that the access fee caps are "outdated" and "counter to the interests of long term investors."[425] The Commission is reducing the access fee caps to accommodate the amendments to Rule 612. Further, retaining a uniform access fee cap structure will benefit the market by introducing less complexity and help to address market distortions that have arisen under the current fee caps. The current market structure has experienced significant changes in trading dynamics and operates under a fee structure that is different from when Rule 610(c) was adopted and problematic for the reasons articulated throughout this release. As discussed above and in the Economic Analysis, the amendment modernizes Rule 610(c) to reflect current trading dynamics and mitigate distortions associated with the preexisting caps while preserving its original objectives.

Some individual commenters recommended that the proposal be modified to go further to address distortions in the market related to the current fee and rebate models.[426] A few

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423 See, e.g., IEX Letter IV at 5; Brandes Letter at 3; Citigroup Letter at 5; BlackRock Letter at 10-11; DOJ Letter at 5; Harris Letter at 1; BMO Letter at 4.

424 IEX Letter IV at 5. See also IEX Letter III at 5.

425 Brandes Letter at 3.

426 See, e.g., Tripari Letter, dated Mar. 28, 2023; Francisco Gil, dated Mar. 28, 2023; We The Investors Letter dated Mar. 30, 2023 at 7; Adam Abreu, dated Apr. 30, 2023 at 2; Michael Dudek, dated Mar. 31, 2023 at 4; Larry Douglas, dated Apr. 1, 2023 at 1 and 3; We The Investors Letter I dated Mar. 15, 20234; Betty Waters Letter, dated Mar. 31, 2023; Harris Letter at 1 & 4.

commenters stated that the access fee caps should be eliminated entirely.[427] One commenter stated that "competitive forces should inform access fees."[428] Another commenter stated that the "solution is to let brokers take fees into consideration in their order routing . . . and route to the market with the best all-in costs," which would obviate the need for the Commission to "get into the price control business."[429]

While some commenters suggested that access fees be further reduced or eliminated altogether, the Commission is not eliminating fees for access to protected quotes. Rule 610(c) establishes limits on the amount of fees that can be charged for access and when the Commission adopted Rule 610(c), the Commission recognized that agency market trading centers have historically relied, at least in part, on charging fees for access. Eliminating or prohibiting access fees entirely would unduly harm the business model of agency market trading centers by not allowing them to collect fees for the execution services they provide.[430] As discussed below, the national securities exchanges are the only trading centers at this time that display protected quotations and they should be able to continue to charge for the execution services they provide.[431]

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427 See Cboe Letter II at 2 and 8; Angel Letter at 7.

428 Cboe Letter II at 2 and 8. See also Angel Letter at 7.

429 See Angel Letter at 7.

430 See Regulation NMS Adopting Release, supra note 4, at 37544-45 (stating the Commission considered market participants' views stating that agency markets must be allowed to charge access fees for their services, as well as those that stated that access fees distort quotation prices and should be banned. In adopting the 30 mil access fee cap, the Commission recognized that "agency trading centers perform valuable agency services in bringing buyers and sellers together, and that their business model historically has relied, at least in part, on charging fees for execution of orders against their displayed quotations." The Commission concluded that "prohibiting access fees entirely would unduly harm this business model."). See infra sections VII.C.2.b and VII.D.2.b.

431 Id. See also infra section IV.D.1.c.

However, while recognizing the importance of the agency market business model to the national market system, in adopting the access fee caps the Commission also was mindful that "[a]ccess fees tend to be highest when markets use them to fund substantial rebates to liquidity providers, rather than merely to compensate for execution services" and artificially high access fees (i.e., those that are used primarily to fund rebates) can undermine price discovery because "the published quotations of such markets would not reliably indicate the true price that is actually available to investors or that would be realized by liquidity providers."[432]

Further, notwithstanding commenters' statements to the contrary, the access fee caps continue to be necessary in order to support the objectives of fair and efficient access to protected quotations, which "is necessary to support the integrity of the price protection requirement established by the adopted the Order Protection Rule."[433] In adopting Rule 611, the Commission stated that strong intermarket price protection offers greater assurance that investors who submit market orders will receive the best readily available prices for their trades.[434] Rule 611 was designed to "strengthen the protection of displayed and automatically accessible quotations in NMS stocks."[435] The Commission recognized that such objectives could be undermined if "outlier" markets could charge high fees to market participants who would be required to pay such high fees to access a protected quotation because of Rule 611. The comments that suggest eliminating the access fee caps and allowing a consideration by brokers

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432 See Regulation NMS Adopting Release, supra note 4, at 37545.

433 See Regulation NMS Adopting Release, supra note 4, at 37502-37503 (stating "protecting the best displayed prices against trade-throughs would be futile if broker-dealers and trading centers were unable to access those prices fairly and efficiently.") See also IEX Letter V at 2 (stating proposal is designed to "prevent high fees from undermining Regulation NMS's price protection privileges afforded to exchanges").

434 See Regulation NMS Adopting Release, supra note 4, at 37501.

435 See Regulation NMS Adopting Release, supra note 4, at 37501.

of all-in costs or relying solely on competition, do not address the concern that led to the adoption of the access fee caps, namely that outlier markets would take advantage of Rule 611 by imposing high fees for access.[436] The access fee caps remain necessary for the reasons they were adopted.

Some commenters stated that the Commission should act to prohibit rebates.[437] While in many cases rebates are funded by the access fees that are collected, Rule 610(c) does not apply to rebates.[438] The Commission is adopting amendments to Rule 610(c) to reduce the access fee caps for the reasons discussed herein, but is not expanding its application to apply to rebates or to eliminate them.[439] The adopted amendments to Rule 610(c) maintain fidelity to the original objectives of the rule, but recalibrate the fee cap amounts to reflect current market structure. As a practical matter, however, the reduced access fee caps in amended Rule 610(c) will likely reduce the rebates paid[440] and, as a result, the amended access fee caps will reduce the distortions created by the existing fee structures that use access fees as a means to fund the payment of rebates in the market.[441]

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436 See supra note 355 and accompanying text.

437 See, e.g., Steven Tripani, dated Mar. 28, 2023; Michael Dudek, dated Mar. 31, 2023 at 4; Betty Waters Letter dated Mar. 31, 2023. One commenter suggested that the Commission should prohibit or restrict the use of CADV-tiers. We the Investors Letter, dated Mar. 30, 2023 at 7. As discussed below, the Commission is adopting Rule 610(d) as proposed which will enhance the transparency of fees and rebates, including fees that may be tiered. The Commission notes that it continues to assess volume-based exchange transaction pricing. See Securities Exchange Act Release No. 98766 (Oct. 18, 2023), 88 FR 76282 (Nov. 6, 2023) (proposing new rule 6b-1 under the Exchange Act, which would prohibit exchanges from offering volume-based transaction pricing in connection with the execution of agency or riskless principal orders in NMS stocks) ("Fee Tiers Proposal"). As discussed below, Rule 610(d) will provide certainty regarding the amount of the fee to be assessed and the rebate to paid at the time of the time of the trade, which is separate and distinct from the Commission's consideration of other regulatory action regarding volume-based transaction pricing. See infra section IV.E.

438 See supra section IV.B.2. See also infra section IV.D.1.b.

439 See infra note 590 and accompanying text.

440 See infra section VII.C.2.

441 See infra section IV.D.1.b and VII.D.2.

One commenter stated that the Commission should require the exchanges to "revert to traditional fees imposed on buyers or sellers or both without regard to the maker-taker status."[442] Rule 610(c) does not require any particular fee structure, like a flat fee structure suggested by a commenter.[443] Instead, the access fee caps set an upper limit on the amount of fees that can be charged for access to protected quotations. Within this construct, trading centers can continue to develop fee structures that are consistent with Rule 610 as well as any other regulatory requirements that may be relevant to a particular trading center.[444]

a. Access Fees and Minimum Pricing Increments

Several commenters stated the Commission should lower the access fee caps regardless of whether any changes are made to the minimum pricing increments and stated that such changes are warranted even if the Commission elects not to proceed with the proposed tick changes.[445] One commenter stated "the current harms associated with the $0.003 access fee cap and maker-taker pricing models exist at the current tick sizes. Accordingly, the Commission should consider reducing the access fee cap even if it ultimately decides not to proceed with the proposed tick size changes."[446] Another commenter, however, "strongly disagreeing" with commenters' suggestion that regulatory reform of exchange fees could proceed independently, stated that "[c]alls for regulatory mandated reductions in exchange access fee caps fail to

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442 See Harris Letter at 1 and 4.

443 See Harris Letter at 4.

444 National securities exchanges establish and amend their fee schedules by filing proposed fee rule changes, pursuant to section 19(b) of the Exchange Act and rule 19b–4 thereunder, for Commission review. See 15 15 U.S.C. 78f(b)(4) and (5)(requiring the rules of the exchange provide for the equitable allocation of reasonable dues, fees, and other charges among members, and issuers and other persons using its facilities and not be designed to permit unfair discrimination).

445 See, e.g., Healthy Markets Letter I at 24; Vanguard Letter at 6. See also supra note 422.

446 See Vanguard Letter at 6.

recognize that exchange access fee caps were adopted and justified to facilitate effective intermarket linkages."[447]

Other commenters stated that the levels of the access fee caps and the minimum pricing increments are connected.[448] One commenter stated "[a] reduction in the minimum tick size without reducing access fees could permit fees to become a higher percentage of the minimum pricing increment, which would almost certainly undermine price transparency."[449] Commenters stated that the access fee caps should be reduced to help ensure that access fees do not become an outsized portion of displayed quotes in light of proposed changes to the minimum pricing increments.[450] One commenter stated that it was "recommend[ing] keeping fees strictly less than ½ of the tick size" in order to prevent "price instability and quote flickering" and stated "[i]f fees reach ½ the tick size, it means that the same effective price point can be achieved multiple ways on an all-in basis with different nominal prices (e.g., an offer at 10.000 with a $0.0005 rebate, or a bid of 10.001 with a $0.0005 rebate)."[451] Another commenter stated "if the access fee cap were to exceed half of the tick size, the paper trail can be not only confusing but can literally misrank trades."[452]

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447 Cboe Letter III at 1-2.

448 See, e.g., SIFMA Letter II at 39 (stating "the Commission appropriately recognized that tick sizes and access fees are linked with each other"); Nasdaq Letter I at 19 ("support[ing] adjusting the access fee cap to accommodate new tick sizes"); Better Markets Letter II at 3-4; MEMX Letter at 22 ("access fees and tick sizes are inherently linked").

449 Better Markets Letter II at 3-4.

450 See, e.g., Invesco Letter at 4; NASAA Letter at 9; JPMorgan Letter at 6; Better Markets Letter II at 4; Healthy Markets Letter I at 22; Pragma Letter at 7; Budish Letter at 6; AIMA Letter at 4.

451 Pragma Letter at 7.

452 Budish Letter at 6.

As recognized by several commenters, access fees and tick sizes are related in certain instances.[453] Specifically, an access fee that is too high when compared to the tick size can create pricing distortions.[454] Therefore, because the Commission is reducing the minimum pricing increments for certain NMS stocks as set forth in Rule 612, the Commission is also reducing the Rule 610(c) access fee caps to prevent introducing pricing distortions that can occur if an access fee is greater than one-half of the tick. Maintaining an access fee cap that is less than one-half of the tick size will preserve coherence[455] and result in lower transaction costs for investors.[456]

Further, lowering the access fee cap to 10 mils for those NMS stocks assigned a lower tick will address the distortionary effect on price transparency that would result absent adjustment to the access fee cap.[457] To illustrate, if the access fee cap remained at $0.003, which would fund rebates at a similar level, and the tick size was adjusted to $0.005, the effect on the price of a stock could be as follows. An executed trade could be displayed at a price of $10.005 followed by another executed trade at a price of $10.010. Many investors would interpret this as a sign that a stock was increasing in value. However, with an access fee of $0.003, the net price of the first order if it represents a market order to buy would be $10.008 (the buyer pays $10.005 and pays $0.003 in fees), whereas the net price of the second order if it is a market order to sell would be $10.007 (the seller receives $10.010 and pays $0.003 in fees). In this example, the price has fallen, not risen. Lowering the access fee cap to 10 mils will mitigate this problem.[458]

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453 See, e.g., MEMX Letter at 22; SIFMA Letter II at 39; Better Markets Letter II at 3-4; Nasdaq Letter I at 19. See also infra section VII.D.2.

454 See infra section VII.D.2.a.

455 See infra section VII.D.2.a.

456 See id.

457 See id.

458 See id.

The Commission also agrees that the access fee caps should be lowered for all NMS stocks regardless of whether a stock is assigned the lower pricing increment of $0.005 or retains a $0.01 minimum pricing increment to address market distortions attributable to the fee structures that have developed under the access fee caps and align the fee caps with current market dynamics. The Commission is reducing the access fee caps for all NMS stocks and maintaining the structure that was originally adopted, i.e., assigning an access fee cap based on the price of the protected quotation. And, as discussed above, maintaining a uniform access fee cap structure will help to ensure that the requirements under Rule 610(c) do not increase the fee structure complexity.

Some commenters were generally supportive of an access fee cap reduction because of the changes to the minimum pricing increment, but offered no or few specifics as to the amount or percentage of the reduction.[459] Other commenters urged the Commission to reduce the access fee caps in a manner that is proportionate to any reduction in the tick (e.g., for a $0.005 tick, the access fee cap should be 15 mils).[460]

Some commenters stated that the access fee caps should be 30% of the minimum pricing increment in order to remain consistent with the percentage level under the preexisting rule.[461] These commenters recommended maintaining the current 30% ratio between tick size and access fee cap because they were primarily concerned that the proposal would result in access fees that were 50% of the tick (an increase in fee to tick ratio) for the smallest proposed tick size (i.e., the

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459 See, e.g., AIMA Letter at 4; Cambridge Letter at 6; ICI Letter I at 16; STA Letter at 8.

460 See, e.g., Pragma Letter at 7; MFA Letter at 13; Schwab Letter II at 6 and 36; SIFMA Letter II at 45; MEMX Letter at 22; Jefferies Letter at 2; NYSE Letter I at 7; Nasdaq Letter I at 29; NYSE, Schwab, and Citadel Letter at 1-2.

461 See, e.g., FIA PTG Letter II at 3; Hudson River Letter at 4; MMI Letter at 7; Robinhood Letter at 46, 56-59. See also MEMX at 22.

proposed $0.001 tick would have been assigned a 5 mils access fee cap). Other commenters expressed concern regarding application of a two-tiered access fee cap structure to a four-tiered reduction in minimum pricing increments.[462] These commenters' concerns regarding both the increase in fee to tick ratio and asymmetrical structure of the proposal, however, have been obviated because the Commission is neither adopting the $0.001 tick, nor the corresponding 5 mils cap.

Other commenters stated that the access fee caps should be reduced only for NMS stocks that are assigned a smaller minimum pricing increment and only in proportion to the amount of a stated corresponding decrease in the tick size, i.e., NMS stocks that were assigned a smaller $0.005 tick size would be subject to a 15 mils access fee cap.[463] Similarly, several exchange groups commented on the proposal and offered alternative approaches to modify Rule 610(c) to reflect the change in minimum pricing increments.[464] One exchange group commenter supported the need to adjust the access fee caps to accommodate the proposed new tick sizes, but stated its view that the proposal went "far beyond what is needed" to achieve that purpose "to the detriment of market quality and the NBBO" because reducing the caps would implicitly reduce rebates, which would impede exchanges' ability to attract liquidity and encourage tighter spreads.[465] As an alternative to the proposal, the commenter recommended the Commission adopt a fee cap of 15 mils for NMS stocks assigned to a $0.005 minimum pricing increment and retain the preexisting 30 mils access fee cap for NMS stocks that retain the $0.01 minimum

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462 See, e.g., JPMorgan Letter at 6; MFA Letter at 13.

463 See, e.g., Fidelity Letter at 14-15; Cambridge Letter at 6; NYSE, Schwab, and Citadel Letter at 2; MEMX Letter at 23; Jefferies Letter at 2; Schwab Letter II at 6.

464 See Nasdaq Letters I and II; NYSE Letter I; and Cboe Letters I-IV.

465 Nasdaq Letter I at 2 and 19.

pricing increment.[466] According to this commenter, this alternative "would cut access fees by half for securities in the $0.005 tick bucket, while preserving room for exchanges to continue [to] offer rebates that are needed to bolster market quality and the NBBO."[467] This commenter further stated that although the Commission intends the proposal to help the exchanges compete for retail order flow by reducing the cost for broker-dealers to access liquidity on the exchange, compressing the access fee caps would make it more expensive to provide liquidity to the exchanges and thus any benefit would be undermined.[468]

Several commenters stated that there should be a uniform fee cap to "avoid any additional market complexity."[469] Some commenters stated that the proposed tiered access fee caps and the proposed variable minimum pricing increments would add unnecessary complexity.[470] One commenter stated that it "strongly favor[ed] a single, consistent standard, rather than multiple caps tied to different ticks, which would create unnecessary complexity."[471] Another commenter stated that applying a uniform cap across all NMS stocks would help to address market distortions such as routing conflicts arising from the maker-taker fee model.[472] Another commenter stated that continuing to apply a uniform cap will more effectively achieve the objectives of Rule 610 because absent such adjustment, "the ability of exchanges to abuse their status as protected markets will be no less for stocks that are assigned a higher tick

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466 Nasdaq Letter I at 2, 19 and 29. See also NYSE Letter I at 7.

467 Nasdaq Letter I at 2.

468 Nasdaq Letter I at 20.

469 Better Markets Letter I at 16. See also e.g., Better Markets Letter II at 4; Brandes Letter at 3; BlackRock Letter at 11; JPMorgan Letter at 6; Invesco Letter at 4.

470 See, e.g., JPMorgan Letter at 6; Brandes Letter at 3.

471 Brandes Letter at 3.

472 Capital Group Letter at 4.

increment."[473] One commenter stated that setting different fee caps based on tick size would "allow exchanges to impose a 'penalty fee' for participants looking to access quotes in stocks that are less actively traded" and further stated that "there is no justification in logic or regulatory purpose to make that distinction."[474] However, other commenters disfavored a "one-size-fits-all" model.[475] One commenter suggested the Commission consider a "dynamic tick size approach with the access fee cap proportionally tied to both smaller and larger tick sizes"[476] and recommended the access fee caps be a certain percentage of the minimum pricing increment, but did not propose a particular percentage that should be adopted.[477]

Other commenters disagreed that the level of the access fee cap should be tied to the pricing increment assigned. One exchange commenter stated that the "original justification for access fee caps had nothing to do with tick sizes" and instead "centered around ensuring that transaction fees did not unduly distort the price of a quote that the Commission was protecting by rule [611]."[478] This commenter also stated that "[m]odifications to access fee caps should only be discussed in the context under which they were conceived" which was "to ensure that market centers displaying the best price did not impose access fees that compromised the value of the better price."[479]

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473 See, e.g., IEX Letter VI at 2.

474 IEX Letter VI at 2.

475 See, e.g., T. Rowe Price Letter at 4; BlackRock Letter at 10-11; Citigroup Letter at 5-6; Letter from Phil Mackintosh, Nasdaq, Inc., dated May 7, 2024, at 2 ("Nasdaq Letter V").

476 Morgan Stanley Letter at 3.

477 Morgan Stanley Letter at 3-4.

478 See Cboe Letter IV at 2.

479 See Cboe Letter IV at 2.

The Commission agrees that one of the purposes of the access fee cap was, and remains, to help to ensure that transaction fees do not unduly distort the price of protected quotations. However, the Commission does not agree that goal is best achieved by adopting certain commenters' recommendation to reduce the access fee caps proportionally (i.e., to 15 mils) and only for those NMS stocks that are assigned a smaller minimum pricing increment. A proportional reduction for a limited universe of NMS stocks would allow higher access fees and rebates along with related market distortions to continue for the NMS stocks that retain the $0.01 increment and would perpetuate unwarranted complexity (e.g., complex orders types, market fragmentation, complex fee and rebate schedules and frequent changes to complex order routing strategies to adjust to fee changes) to the current market structure.[480] Applying a uniform 10 mil access fee cap to access protected quotations in all NMS stocks priced $1.00 or greater will avoid injecting complexity[481] in the market and will continue to guard against "outlier" markets undermining the objectives of Rule 611.

While the Commission agrees with commenters that tick size and access fees are relational in so far as the access fee cannot be more than half of the minimum pricing increment (for the reasons discussed above), maintaining the current proportionality of the access fee to tick could perpetuate distortions in the market. As stated by one commenter, "when the cap was set in 2005, neither the Commission nor commenters ever suggested that the cap should be exactly equal to a fixed proportion of the tick size."[482]

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480 See infra section VII.D.2.

481 See infra section VII.D.2.d.

482 IEX Letter V at 7.

Further, lowering the access fee cap for only those NMS stocks that are assigned a lower minimum pricing increment (i.e., those NMS stocks that are constrained by the $0.01 minimum pricing increment) and maintaining the preexisting (30 mils) fee cap for all other NMS stocks priced $1.00 or greater could increase the probability that some stocks will oscillate from one tick size to another rather than settling on an appropriate tick. This oscillation creates additional cost for market participants, introduces complexity in the markets and creates operational risk.[483] In addition, continuing to apply a 30 mil access fee cap to those NMS stocks that continue to be assigned a $0.01 pricing increment would ignore the efficiencies in trading[484] that have been realized in the intervening 19 years since the caps were adopted and would not address the distortive effects of access fee structures that assess access fees at or near the current cap in order to maximize the amount of the rebate that can be offered.[485]

In addition, as discussed below, and supported by some commenters, fees and rebates which are currently benchmarked against the 30 mil cap have a negative impact on price transparency and routing practices.[486] According to one commenter, "there is evidence that exchanges that pay the highest rebates often provide worse execution quality."[487] Another commenter provided data it said demonstrates that "poor execution quality is directly linked to high access fees."[488]

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483 See infra section VII.F.2.a.

484 See supra note 405 and accompanying text (discussing trading efficiencies due to technology changes and reduced costs), infra note 598, and infra section IV.D.1.d.

485 See infra section IV.D.1.d.

486 See, e.g., IEX Letter IV at 2-4; Better Markets Letter I at 16.

487 Better Markets Letter I at 16. See also IEX Letter VI at 7; NASAA at 9.

488 IEX Letter VI at 7.

Lowering the cap to 10 mils for all NMS stocks, both those that are assigned a $0.005 tick and those that retain the $0.01 tick, will benefit market participants, including investors, by lessening the incentives to route to a market in order to receive a rebate.

The Commission proposed a two-level access fee cap structure for access to protected quotes in NMS stocks priced at $1.00 or more to accommodate the proposed variable minimum pricing increment structure and specifically to prevent the access fee caps from creating pricing distortions with the smallest proposed minimum pricing increment (i.e., 5 mils access fee cap for NMS stocks that would have been assigned a $0.001 pricing increment and 10 mils cap for NMS stocks that would have been assigned a pricing increment greater than $0.001).[489] Specifically, the proposed 5 mil access fee cap was necessary to accommodate the proposed lowest $0.001 minimum pricing increment because imposing the proposed 10 mil access fee cap on the $0.001 minimum pricing increment would have created distortions in quoting and negatively impact pricing transparency.[490]

Several commenters raised concerns about the proposed 5 mil access fee cap and its ratio as compared to the minimum pricing increment.[491] One commenter stated that "[a]t 50% of the minimum pricing increment, a round trip buy and sell trade could result in access fees equal to the spread" and expressing concern that "at 50% of the spread, rebates of greater than half of the

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489 See Proposing Release, supra note 11, at 80348 (stating "the access fee cap should not be greater than ½ of the tick size in order to preserve coherence between net and nominal price rankings of trading venues. This would not be possible with an access fee cap of $0.001 and a lowest possible proposed tick size of the same amount, as would be the case for the smallest tick size tier from the proposal.").

490 See Proposing Release, supra note 11, at 80267 & 80289-90 (stating "[a] reduction in the minimum pricing increment without reducing the access fee caps could permit fees to become a higher percentage of the minimum pricing increment, which could potentially undermine price transparency and exacerbate the other concerns with maker-taker fees.").

491 See, e.g., Schwab Letter II at 6 and 36; SIFMA Letter II at 45; Citadel Letter I at 23; Hudson River Letter at 4; AIMA Letter at 4; Robinhood Letter at 57-58.

minimum pricing increment could lead to market distortion."[492] Because the amendment to Rule 612 does not include the $0.001 minimum pricing increment, the Commission is not adopting the 5 mils access fee cap. Specifically, with the elimination of the proposed $0.001 minimum pricing increment,[493] the proposed 5 mil access fee cap is unnecessary.[494] Accordingly, the Commission is adopting the proposed 10 mils access fee cap as proposed.[495] The Commission is removing the proposed tiered approach to the access fee caps and instead maintaining the preexisting single, uniform access fee cap structure for protected quotes priced $1.00 or more.[496] The amendment will introduce fewer variables, less complexity and lower cost and operational risk as compared to the proposed two-level access fee cap structure.[497] More specifically, as is the case today, there will be one access fee cap for NMS stocks priced at $1.00 or more and a separate access fee cap that applies to NMS stocks priced below $1.00.

b. Impact on Liquidity and the NBBO

Some commenters stated that lowering the access fee cap to 10 mils would not impinge on the exchanges' ability to offer incentives and attract liquidity and instead stated that reducing

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492 Hudson River Letter at 4.

493 See supra section III.C and supra note 346.

494 This approach is consistent with some commenters' recommendations. See, e.g., Better Markets Letter I at 16 (stating "the Commission should just dispense with the $0.001 tick size altogether" because doing so would eliminate "the need for a separate [5 mil] access fee cap." This commenter stated that proceeding in this manner would maintain a single uniform cap for all stocks and avoid introducing additional complexity).

495 See supra note 346.

496 Several commenters expressed support for expanding the application of the access fee caps in certain ways. See, e.g., infra notes 614 - 616. Expanding or altering the structure of the cap would add complexity to the national market system. As discussed above, in response to commenters, amended Rule 610(c) introduces fewer variables and less complexity into the national market system. Expanding the application of Rule 610(c) and/or modifying its structure as these commenters suggest would be inconsistent with this approach.

497 See Regulation NMS Adopting Release, supra note 4, at 37595.

the caps would likely draw liquidity back to the exchanges.[498] According to one commenter, "ATSs and other off-exchange venues generally charge rates much lower than the access fees imposed by most exchanges. Because their cost of access is so much higher than on other venues, exchanges become the venue of 'last resort.'"[499] This commenter further stated that "modernizing the access fee cap and bringing exchange access fees in line with off-exchange trading venues will reduce the need for exchange avoidance and naturally result in a better experience for liquidity providers, one that will not need to be 'offset' by rebate payments."[500] Another commenter stated that "[b]rokers' avoidance of these fees is a significant contributor for brokers often choosing to internalize or first route to ATSs or OTC market makers, rather than to exchanges with their customers' orders."[501] Another commenter stated that "the 30-mil cap is among the factors driving the shift away from displayed trading."[502] One commenter stated "reduced displayed trading is a problem because it impedes the fair and transparent distribution of pricing and transaction information that Congress directed the Commission to protect . . . [and] the 30-mil cap is among the factors driving the shift away from displayed trading."[503] And another commenter stated that lower access fees will impose lower costs on investors, "removing a disincentive for trading on exchanges."[504]

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498 See IEX Letter IV at 18-19, 22; Themis Letter at 8; Better Markets Letter I at 16; BMO Letter at 3-4; ASA Letter at 5.

499 IEX Letter IV at 18.

500 IEX Letter IV at 18-19.

501 Healthy Markets Letter I at 21.

502 IEX Letter IV at 6. See also ASA Letter at 5.

503 IEX Letter IV at 6.

504 Better Markets Letter I at 16. See also IEX Letter VI at 1.

Other commenters stated that lowering the access fee caps would address other concerns regarding market distortions associated with the payment of high rebates.[505] One commenter stated that "[r]ebates distort supply and demand and harm the price discovery process."[506] One commenter stated that reducing the cap to 10 mils would "provide ample room for exchanges to create incentives, charge premium or discounted prices, and earn a profit, all while lowering the distortive effects they have on the equity market."[507] In addition, some commenters stated that reducing the cap would alleviate the potentially distortive effects of the maker-taker pricing model.[508] According to one commenter, "the current fee levels foster and enable significant market distortions in today's marketplace" and "the fees charged by exchanges often serve as powerful disincentives for market participants to access that liquidity."[509] Another commenter "recognize[d] that access fees and the rebates that they fund serve an important function in incentivizing liquidity provision for thinly-traded securities and compensating market makers for adverse selection," but also stated that "[p]rudent regulation must appropriately . . . balance the beneficial effect of access fees on liquidity against the potential for market distortions" associated with maintaining the 30 mil cap.[510] According to this commenter, "lowering fees would mitigate the detrimental effect of access fees on order routing, price transparency, and market quality in many securities."[511] Further, another commenter stated that when the

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505 See IEX Letter IV at 10-11, 16; Themis Letter at 7.

506 Themis Letter at 7. See also IEX Letter IV at 16; Verret Letter III at 11, 13-14.

507 BMO Letter at 4. See also Tripari Letter; Verret Letter III at 13; Proposing Release, supra note 11, at 304.

508 See, e.g., BMO Letter at 4; Brandes Letter at 3; Healthy Markets Letter I at 21; Themis Letter at 7; Council of Institutional Investors Letter at 3. See also infra section VII.D.2 (discussing market distortions).

509 Healthy Markets Letter I at 21.

510 BlackRock Letter at 10-11.

511 Id. at 10.

Commission adopted the preexisting caps, "its focus was on limiting the distortive impact of disproportionate access fees, not on facilitating the ability of markets to pass them through as rebates." According to this commenter, the only way in which the Commission viewed access fees and rebates as related was that "a fee limit was needed to avoid distortive pricing of the type that occurs when access fees are primarily passed through to other participants in the form of rebates."[512] This commenter further stated that the "bulk of executions against displayed quotes pay the maximum fee, with the overwhelming share of that revenue being passed through as rebates."[513]

Finally, one commenter stated "the pricing distortions the Commission was concerned about when it adopted Regulation NMS have become acute today due to changed market conditions" resulting in brokers being incentivized to "route orders away from best-displayed exchange quotes in order to avoid the high fees – precisely the result the Commission sought to avoid when it first adopted the cap."[514] This commenter also stated that "the introduction of 'inverted' venues that pay rebates to access rather than provide displayed orders, and the use of highly-skewed rebate tiers, has created even more price distortion and misaligned incentives."[515]

Other commenters opposed any changes to the existing access fee caps because they stated that reducing the caps would limit the exchanges' ability to offer rebates to incentivize liquidity providers, as access fees typically fund such rebates and this could negatively impact liquidity on exchange markets.[516] Some commenters stated that the reduction in the access fee

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512 IEX Letter IV at 5.

513 Id.

514 IEX Letter IV at 5.

515 IEX Letter IV at 5.

516 See, e.g., World Federation of Exchanges Letter at 4; Virtu Letter II at 8, 16-17; Citadel Letter I at 22.

caps, which would reduce rebates, would result in wider spreads, and less quoted size which would increase trading costs.[517] One commenter stated that the "cost of widening spreads that would result from removing fees and rebates would cost retail investors . . . as much as $687 million per year."[518] Some commenters stated that the reduction of rebates would impact spreads, which (according to those commenters) suggests that rebates have an impact on displayed pricing.[519] Other commenters stated that the reduction in rebates would have a negative impact on market liquidity.[520] One commenter stated that the current access fee cap levels "help[] improve liquidity and provide narrower quotes than otherwise would be available in the marketplace."[521] Similarly, another commenter stated support for further "examining changes to the access fee cap," but cautioned "that wholesale reductions, particularly when combined with other changes . . . will disincentivize liquidity provision, reduce market maker support, widen bid-ask spreads, and increase volatility in thinly-traded securities."[522] Some commenters stated that certain securities may "require rebates larger than 10 mils to incentivize tight quotes."[523] However, another commenter stated that claims of "hidden costs to investors, in the form of worse NBBO prices, wider spreads, higher costs for retail investors, in the form of worse NBBO prices, wider spreads, higher costs for retail investors and less liquidity for thinly-

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517 See, e.g., State Street Letter at 4, Interactive Brokers Letter at 5, Nasdaq Letter I at 23, Nasdaq Letter II at 5-6, Letter from Brett Kitt, Associate Vice President, Principal Associate General Counsel, Nasdaq, Inc., dated Feb. 14, 2024 ("Nasdaq Letter III") at 5, Cboe Letter III at 8.

518 Nasdaq Letter III at 5.

519 See, e.g., Cboe Letter II at 8-9; Cboe Letter III at 8; Nasdaq Letter I at 2; Nasdaq Letter I at 22.

520 See, e.g., CCMR Letter at 27, Interactive Brokers Letter at 5.

521 Fidelity Letter at 14.

522 State Street Letter at 4. See also CCMR Letter at 27; Interactive Brokers Letter at 5; Nasdaq Letter I at 23; Nasdaq Letter II at 5-6; Nasdaq Letter III at 5.

523 Fidelity Letter at 14. See also e.g., Nasdaq Letter II at 6; State Street Letter at 4.

traded securities" did not have a factual basis and did not account for the "tangible cost reductions that would arise from lower access fees."[524]

Certain exchanges also opposed any changes to the access fee caps, stating that reducing the access fee caps would impede their ability to offer competitive rebates and meaningful price differentiation, hindering their ability to attract liquidity and compete with off-exchange trading venues for order flow.[525] One commenter stated that "[c]ompressing the caps further . . . [would] introduce additional concerns with implications for competition and market quality."[526] In addition, this commenter stated that rebates, which are funded by access fees, are "innovative and critically important tools that enhance market depth, promote tighter bid-ask spreads, and encourage order flow to be routed to lit exchanges" and any diminution in the access fee caps would "in fact disrupt current business practices and competitive dynamics."[527] This commenter also stated that reducing the access fee caps could "have significant revenue consequences,"[528] but provided no specifics. Another commenter stated that reducing rebates "discourages on-exchange market making," which could deteriorate the NBBO as it "would be drawn from a smaller and less representative pool of displayed liquidity."[529] According to this commenter, although the proposal might make it cheaper for broker-dealers to access liquidity, costs for liquidity providers and market makers would increase, and spreads would widen, which in turn

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524 See IEX Letter IV at 22.

525 See Cboe Letter II at 8-9; Cboe Letter III at 8; Nasdaq Letter I at 2; Nasdaq Letter I at 22. See also e.g., Virtu Letter II at 8; Citadel Letter I at 22.

526 See Cboe Letter II at 8. See also Cboe Letter IV at 2; Nasdaq Letter I at 22-29; Nasdaq Letter IV at 8.

527 Cboe Letter III at 4. See also Cboe Letter IV at 3; Nasdaq Letter I at 20.

528 Cboe Letter IV at 3.

529 Nasdaq Letter II at 7. See also Nasdaq Letter I at 19; Nasdaq Letter III at 5-6. But see IEX Letter IV at 10-11 (stating "[t]here is ample evidence that maintaining the access fee cap at its current level has led to distortions the Commission sought to avoid.").

would result in higher "all-in" costs for investors.[530] Further, one commenter stated that the proposal "risks weakening the NBBO by restricting exchanges' ability to offer meaningful rebates to encourage more liquidity and tighter spreads that underpin the NBBO"[531] and stated that the NBBO is "comprised exclusively of trading interest displayed on public exchanges. . . [and] limit[ing] exchanges' ability to gather liquidity . . . would weaken the public reference price."[532] According to this commenter, "rebates are essential to market quality as they encourage market participants to act as market makers and provide two-sided quotes that make the equity markets function soundly."[533] This commenter further stated that rebates provide "integral value to the operation of well-functioning, fair, and orderly equity markets" because they serve to cushion market makers against the risks of adverse selection and price volatility, thereby incenting them to continue to make markets, even in thinly-traded or volatile securities, and to do so with tighter spreads than they would otherwise."[534] According to the same commenter, a reduction in rebates would lead to greater market complexities because there would be more "speedbump or 'quote protection' markets" and a "[g]reater focus on segmentation."[535] This commenter also stated that the proposal would "potentially undermine the competitive positions of the exchanges and the market makers that quote on them by seeking to limit their ability to charge fees and collect rebates for their respective services."[536] Another commenter stated that "it is entirely inappropriate to experiment with *exchange* pricing models

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530 Nasdaq Letter I at 20; Nasdaq Letter II at 6-7.

531 Nasdaq Letter I at 2, 22.

532 Nasdaq Letter I at 22.

533 Nasdaq Letter I at 22

534 Nasdaq Letter I at 22.

535 Nasdaq Letter IV at 8.

536 Nasdaq Letter I at 21.

for fear of *broker* failings" and "exchange fees are extremely transparent . . . and receive a significant amount of SEC review."[537]

Finally, one commenter "question[ed] the Commission's authority to reduce the fee cap beyond what is needed to accommodate the new, smaller tick sizes, thereby with the implicit aim of limiting the ability of exchanges to provide meaningful rebates to market participants."[538] According to this commenter, the Commission "lacks the authority to enact radical changes to exchange access fees without explicit congressional mandate" and "the Commission's charge to establish a national market system evidences no express intent for the Commission to impose price controls upon exchanges as a means of promoting competition."[539]

Other commenters stated that the Commission had clear statutory authority to adopt Rule 610 and to make subsequent adjustments to the access fee caps.[540] One commenter stated that "a plethora of items in the 34 Act, the SEC's prior 50 years of regulation of the National Market System, and related constitutional precedent regarding the private non-delegation doctrine specific to self-regulatory organizations (SROs) – not only give the SEC sufficient delegation of authority to adopt the pending NMS proposal, they compel the SEC to exercise its authority that oversees a dynamically changing national market system."[541]

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537 Cboe Letter III at 5-6.

538 Nasdaq Letter VI at 1.

539 Nasdaq Letter VI at 2.

540 See, e.g., IEX Letter IV at 3; Letter from J.W. Verret, Associate Professor, George Mason University, dated Aug. 27, 2024 ("Verret Letter IV").

541 Verret Letter IV at 2.

As discussed above,[542] section 11A(c)(1)(B) of the Exchange Act authorizes the Commission to adopt rules assuring the fairness and usefulness of quotation information.[543] Further, Congress explicitly granted the Commission "broad authority to oversee the implementation, operation, and regulation of the national market system" and the "clear responsibility to assure that the system develops and operates in accordance with Congressionally determined goals and objectives" which requires balancing different, and often competing, interests and components of the complex national market system.[544] The access fee caps in preexisting Rule 610(c) were adopted through rulemaking pursuant to the Exchange Act, including section 11A, and recalibration of the levels of the access fee caps falls squarely within the Commission's statutory authority. The commenter that questioned the Commission's authority to reduce the level of the access caps to 10 mils acknowledged the Commission's authority to reduce the access fee caps "to accommodate the new, smaller tick sizes"[545] and in an earlier comment letter stated it "supports adjusting the access fee cap to accommodate new tick sizes."[546] The Commission's authority set forth in the Exchange Act is not circumscribed in the manner suggested by this commenter. Congress granted the Commission broad authority to oversee the national market system and ensure that it is meeting the investment needs of the public. The reductions in the access fee caps adopted herein are designed to improve market quality for market participants accessing protected quotations in all NMS Stocks, not just those

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542 See supra section IV.A. See also sections I and I.B.

543 15 U.S.C. 78k-1(c)(1)(B). Section 23 of the Exchange Act also authorizes the Commission "to make such rules and regulations as may be necessary or appropriate to implement the provisions" of the Act. 15 U.S.C. 78w(a)(1).

544 See supra notes 2-3 and accompanying text.

545 Nasdaq Letter VI at 1 and Nasdaq Letter I at 2.

546 Nasdaq Letter I at 2.

that will be assigned a new minimum pricing increment. As discussed throughout, the adjusted level of the caps also will allow trading centers to retain their net capture for transactions of protected quotations priced $1.00 or more and therefore trading centers who wish to use rebates to attract liquidity may continue to do so. Accordingly, the Commission has considered and balanced policy objectives in this complex area and reached an appropriate policy decision.[547]

Although some commenters stated that rebates are essential to attract liquidity on exchanges,[548] the access fee caps were not established to support trading centers' ability to offer rebates or to ensure a particular level of rebate payment; they were developed as a means to help ensure fair, efficient, and ready access to protected quotes, to preserve the integrity of displayed prices and to ensure that the objectives of Rule 611 would not be undermined by trading centers who might seek to charge exorbitant fees to those now required to access their protected quotations.[549] The Commission disagrees that rebates are essential to attract liquidity on national securities exchanges or the only means of attracting liquidity.[550] The Commission stated in 2005 that markets have "significant incentives to be near the top in order-routing priority"[551] and displaying the best protected quotation will attract liquidity to a market. The adopted

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547 See Regulation NMS Adopting Release, supra note 4, at 37498. As was the case when the Commission adopted the preexisting fee caps, the rulemaking process has required the Commission to "grapple with many difficult and contentious issues that have lingered unresolved for many years" and after examining these issues and assessing the views of commenters, particularly those that disagree with the proposal, "decisions must be made and contentious issues must be resolved so that the markets can move forward with certainty." Id. While the Commission always seeks to achieve a consensus, "consensus can mean indefinite gridlock that ultimately could damage the competitiveness of the U.S. equity markets [ ]. [T]he time has come to make the difficult decisions necessary to modernize and strengthen the national market system." Id.

548 See, e.g., Cboe Letter III at 6-7; World Federation of Exchanges Letter at 4; Virtu Letter II at 8, 16-17; Citadel Letter I at 22.

549 See Regulation NMS Adopting Release, supra note 4, at 37503.

550 See id. at 37596.

551 Id.

amendments will continue to allow for trading centers to develop different fee models while also preserving the objectives of Rule 610(c). Further, market participants that post non-marketable orders are able to price their orders to accommodate the risk of adverse selection and rebates are not necessary for compensating this risk.

Reducing the access fee caps will help to alleviate the distortive effects of the preexisting level of access fees and the rebates they fund. The access fee caps were designed to protect limit orders and to assure that orders could be routed to those markets that were displaying the best-priced quotations.[552] As the Commission stated when it adopted the access fee caps, "[a]ccess fees tend to be highest when markets use them to fund substantial rebates to liquidity providers, rather than merely to compensate for execution services. If outlier markets are allowed to charge high fees and pass most of them through as rebates, the published quotations of such markets would not reliably indicate the true price that is actually available to investors or that would be realized by liquidity providers."[553] The Commission also discussed the potential distortionary effect of high fees and rebates on displayed quotes and sought to assure that displayed prices were within a limited range of net prices.[554]

In the current national market system, fees for access to protected quotes are typically charged at the highest amount allowed under Rule 610(c) and the vast majority of the fees collected are paid out as rebates.[555] This practice results in displayed quotations prices that are

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552 See Regulation NMS Adopting Release, supra note 4, at 37545.

553 See Regulation NMS Adopting Release, supra note 4, at 37545. See also IEX Letter V at 3 (stating "there is an obvious and direct connection between high access fees and the extent to which displayed prices deviate from the true prices at which participants are prepared to trade.").

554 See Regulation NMS Adopting Release, supra note 4, at 37502.

555 See infra section VII.C.2 and section VII.B.3 (stating most exchanges charge the maximum fee (in the range of 30 mils) and provide the maximum rebate (in the vicinity of 30 mils) and stating that the primary

not reflective of underlying economics of liquidity supply and demand, but rather displayed quotations prices that have been calculated to account for the receipt of a rebate.[556] The Commission is concerned that this structure impairs the fairness and accuracy of displayed quotations.

The access fee caps set an outer limit on the cost of accessing protected quotations to "assure[ ] order routers that displayed prices [are] within a limited range, true prices."[557] In setting the maximum level for the access fees trading centers could charge market participants to access a protected quotation in 2005, the Commission specifically recognized that "some markets might choose to charge lower fees, thereby increasing their ranking in the preferences of order routers. . . while [o]thers might charge the full $0.003 and rebate a substantial proportion to liquidity providers."[558] The Commission left it to the markets and competition to determine what strategies would be successful in attracting order flow, subject to the maximum access fee cap.[559] Without an access fee cap, the Commission was concerned that certain markets would charge

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reason that access fees remain near 30 mils on most exchanges is to fund rebates) and infra section VII.C.2.c, Table 4.

556 See infra section VII.B.3.

557 Regulation NMS Adopting Release, supra note 4, at 37502. See also IEX Letter IV at 4 and 15 (stating "[t]he purpose [for capping access fees] is not, and has never been, to allow exchanges to maintain rebate payments at current high levels.").

558 Regulation NMS Adopting Release, supra note 4, at 37545 (stating that establishing the $0.003 cap to "limit the outlier business model [and] plac[ing] all markets on a level playing field in terms of the fees they can charge and the rebates they can pass on to liquidity providers. Some markets might choose to charge lower fees, thereby increasing their ranking in the preferences of order routers. Others might charge the full $ 0.003 and rebate a substantial proportion to liquidity providers. Competition will determine which strategy is most successful."). See also Proposing Release, supra note 11 at 80348 (stating "The Commission recognizes that an access fee cap of 10 mils for stocks . . . would provide exchanges with enough pricing freedom to continue to offer economically meaningful rebate-tiering."). One commenter stated that "diminished reliance on the maker-taker economics would encourage a variety of alternative market models for providing liquidity," which in this commenter's view would be consistent with the outcome the Commission anticipated in 2005, but which has not been realized. Decimus 2016 Letter at 11.

559 Regulation NMS Adopting Release, supra note 4, at 37545.

high fees and pass most of them through as rebates, which would undermine price discovery and price transparency.[560] The Commission's concerns when it adopted Regulation NMS, that access fees might gravitate to the highest level permitted by Rule 610 and the impact on price transparency, have been realized to the detriment of investors.[561]

As discussed below, the reduction in the access fees will improve market quality.[562] For those NMS stocks that are not experiencing a constraint on the quoted spread due to the minimum pricing increment, transaction costs will remain largely unchanged under the amendments as spreads will adjust on average to offset the reduction in access fees and rebates.[563] For those NMS stocks that do experience constraint on the quoted spread due to the preexisting minimum pricing increment, transaction costs for liquidity seekers will go down and the oversupply of liquidity will be reduced, which will allow for shorter queues and higher fill rates.[564] For these NMS stocks, the access fee functions as a tax on liquidity demand.[565] Reducing the access fee in these constrained stocks will result in savings for investors.[566]

Further, while some commenters stated that exchange volume would decline and that OTC trading would increase if the access fee caps were reduced, as discussed below,[567] analysis indicates that liquidity providers would not be deterred from quoting on exchange because they

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560 Id. See also Better Markets Letter II at 3 (lowering access fees would "ensure that the fees charged to access a protected quotation do not distort the true price that is available to investors.").

561 See Proposing Release, supra note 11, at 80292 n.317 and accompanying text and 80290 n.302. See also infra section VII.A.

562 See infra section VII.B.

563 See infra section VII.D.

564 See infra section VII.D.2.c.

565 See infra section VII.D.2.c.

566 See infra section VII.D.2.

567 See infra note 1469, and accompanying text.

will be able to widen their quote to reflect the reduced rebate, thereby receiving the same economic profit as they received with the rebate. Liquidity demanders would not be worse off because the reduction in access fee would offset, or, in the case of stocks with an economic spread of less than a tick, more than offset, the increase in spread.[568]

Some commenters stated that the reduced access fee caps would help to address potential conflicts of interest in routing decisions that may harm execution quality of customer orders.[569] One commenter stated that "lowering the access fee cap would lead to a reduction in broker conflicts of interests."[570] Another commenter stated that the proposal "will help to reduce the extent of the conflict of interest in agency routing decisions."[571] Another commenter stated "[w]e have long supported the Commission addressing the conflict faced by brokers related to incentives created by access fees and rebates in the maker/taker model" and that "a simple reduction of access fees across all venues to $0.001 would go a long way in mitigating order routing conflicts.[572]

Another commenter, however, stated that the Commission did not provide any new data to support its position that access fees and rebates are "actually harmful to the market" and further stated that "the Commission's supposition that rebates present harmful conflicts-of-interest to brokers is not supported with evidence, and it ignores the countervailing benefits associated with rebates, which are essential tools for gathering the displayed quotes that form the

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568 See infra section VII.D.2.c.

569 See, e.g., Proof Letter at 1; RBC Letter at 4; Ontario Teachers et al. Letter at 2; NASAA Letter at 9; Vanguard Letter at 6; BlackRock Letter at 10; Capital Group Letter at 4; Themis Letter at 7.

570 RBC Letter at 4.

571 Proof Letter at 1.

572 Capital Group Letter at 4.

NBBO."[573] Another commenter stated that "half of the rebates on Cboe accrue to non-agency market-making activity – thus, there is no real or perceived conflicts of interest" and for agency order flow, some of that flow is "'directed' meaning clients give specific instructions for the order to be routed to a particular venue for execution" and thus there similarly is no conflict.[574] This commenter further stated, "brokers have a duty of best execution regardless of the pricing model used by the exchange."[575]

The Commission disagrees with those commenters that questioned the existence of potential conflicts of interest. The Commission has received comments from market participants that have stated that potential conflicts of interest are a concern because of the fee/rebate models. Some commenters stated that fees and rebates that are currently benchmarked against the 30 mil cap have a negative impact on routing practices[576] and one commenter offered evidence that "exchanges that pay the highest rebates often provide worse execution quality."[577] Another commenter provided data it said demonstrates that "poor execution quality is directly linked to high access fees."[578] Moreover, the Commission has heard similar concerns about potential conflicts of interest created by the fee and rebate schedules and their impact on market quality

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573 Nasdaq Letter I at 2 (stating "It would be arbitrary and capricious for the Commission to proceed with the Proposal in the absence of evidence that the current fee cap is actually harmful to the market and without meaningfully weighing the costs and benefits of those reductions."); Nasdaq Letter III at 6 (stating the Commission "did not cite any new research conducted subsequent to the Transaction Fee Pilot to support the SEC's change of position that access fees and rebates are actually harmful.").

574 Cboe Letter III at 5-6.

575 Cboe Letter III at 5-6.

576 See, e.g., IEX Letter IV at 2; Better Markets Letter I at 16.

577 Better Markets Letter I at 16.

578 IEX Letter VI at 7.

for many years.[579] The 10 mils access fee cap is appropriate because it will mitigate the potential conflicts of interest associated with the current fee and rebate models, while still allowing exchanges to use rebates to attract liquidity.

c. Agency Market Business Model

Several commenters stated that the Commission should not consider whether the proposed lowered access fee caps would unduly impair current agency market business models[580] as a factor in its analysis.[581] According to one commenter, "setting access fee caps, or designing any aspect of market structure, specifically to preserve or protect existing exchange fee models is an inappropriate policy rationale."[582] Similarly, another commenter stated that it "is not the Commission's role to ensure that trading centers 'maintain their current net capture rate.'"[583] Further, one commenter stated that while, in its opinion, it would be appropriate for the

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579 For example, in 2018, one market participant stated that the preexisting level of the access fee cap may "create misaligned incentives and potential conflicts of interest for broker dealers' routing and execution decisions . . . because broker dealers may elect to post non-marketable limit orders on market venues offering the highest rebate and bypass those venues where there is greater likelihood of execution, but a higher fee." Goldman 2018 Letter at 3-4. This market participant went on to state that "[b]y maintaining the Fee Cap at the level adopted in 2005 as spreads have narrowed and commissions have decreased over the past 13 years, these misaligned incentives and potential conflicts of interest have grown." Id. at 4. According to this market participant, adjusting the access fee cap to 10 mils "would reduce the effect of these misaligned incentives and the potential conflicts of interest." Id. Further, a decade ago, one commenter stated "[a] reduction in the cap [to 10 mils] . . . would naturally move more executions back to exchanges." Citigroup 2014 Letter at 7. Another commenter stated in 2015 that a reduction in the access fee cap to 5 mils (half of the amended level adopted today) would "still allow room for exchanges to provide rebates to market participants in order to incentivize liquidity, while at the same time significantly reducing the market distortions and unnecessary complexity that access fees have caused." Letter from Theodore R. Lazo, Managing Director & Associate General Counsel, SIFMA, to Mary Jo White, Chair, Commission, dated May 24, 2015, at 2-3 (stating its support for BATS' 2015 Petition for Rulemaking to, among other things, reduce the baseline access fee cap to 5 mils).

580 See Proposing Release, supra note 11, at 80270 n.35 (stating "[a]gency market trading centers are those that bring together buyers and sellers and typically charge a fee for their execution services."). See also Regulation NMS Adopting Release, supra note 4, at 37545.

581 See, e.g., Citadel Letter I at 22-23; Schwab Letter II at 36; SIFMA Letter II at 39-40.

582 SIFMA Letter II at 39-40.

583 Schwab Letter II at 36. See also Virtu Letter II at 17-18.

Commission to "assess the impact of the proposed access fee cap on market participants' varying business models," it must "then account for the impact of the proposed access fee cap on all market participants and attempt to create the most competitive and effective environment on an overall basis, rather than doing so exclusively for exchanges."[584]

In considering whether to adjust the level of the access fee caps, and if so, by what amount, the Commission has considered the impact of such modifications on market participants to help ensure that all investors will continue to have fair and non-discriminatory access to protected quotations and the Commission has not prioritized exchange revenues over other considerations. When the Commission adopted the access fee caps in Regulation NMS, it considered the impact of the caps on the agency market business model, as it has done in this release as well.[585] Agency market trading centers have historically charged transaction fees for their agency services in bringing together buyers and sellers to execute transactions. The Commission is not prohibiting agency market trading centers from continuing to assess fees for providing execution services to access protected quotations. As discussed above, it was appropriate and consistent with its responsibilities under the Exchange Act for the Commission to consider the impact of the original access fee caps on the ongoing viability of different trading centers. Because of the important role agency market trading centers continue to play in the national market system, it is similarly consistent with the Exchange Act for the Commission to undertake a similar analysis today in adjusting the level of the caps.

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584 Virtu Letter II at 18.

585 See Regulation NMS Adopting Release, supra note 4, at 37545 ("stating "the adopted [30 mils] fee limitation will not impair the agency market business model.").

The Proposing Release estimated the effect on exchange net capture because exchanges are the only trading centers that impose fees for access to protected quotations at this time and, therefore, are subject to the access fee caps.[586] Further, the Commission's analysis in the Proposing Release appropriately considered the impact of proposed changes to Rule 610(c) on entities employing an agency market business model because Rule 610(c) applies to those entities and the Commission was cognizant of not compressing the access fee caps so far as to effectively eliminate such business models.[587] As discussed above, the Commission stated that if markets are allowed to charge high access fees and pass most of them through as rebates, the published quotations of such markets will not reliably indicate the true price that is available and investors may be overcharged for taking liquidity.[588] As discussed below, the Commission estimated the current net capture of the exchanges at approximately 2 to 6 mils and anticipates that will remain the same under amended Rule 610(c).[589]

As was the case with the original access fee caps, the amended fee caps will preserve the agency business model because trading centers will continue to be able to assess fees for transaction services at a level that will result in the same net capture as they earn today if they so choose. In this manner, the amended fee cap for protected stocks priced $1.00 and above has been "drafted to have minimal impact on competition and individual business models while

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586 The Commission used these same estimates to determine the changes in the amount that liquidity demanders would pay and the amounts that liquidity providers would receive. See Proposing Release, supra note 11, at section V.D.3 (discussing impact of the proposed lower access fee caps on exchanges' net capture).

587 See Proposing Release, supra note 11, at 80290-91 (proposing new caps designed to "allow current business practices to continue while adjusting access fee levels to align with the proposed lower minimum pricing increments as well as reflect market innovations and technological efficiencies that have driven transaction costs down since rule 610(c) was adopted.").

588 See Regulation NMS Adopting Release, supra note 4, at 37584.

589 See infra sections VII.C.2 and VII.D.2.b and notes 1101-1103 and accompanying text.

furthering the objectives of the Exchange Act by preserving the fairness and usefulness of quotations."[590] In determining the new levels of the access fee caps, the Commission has considered many factors, including allowing for a diversity of business models.[591] The amendments to Rule 610(c) will continue to allow the exchanges to provide execution services using their current business models, innovate and compete for order flow, while also reducing the costs to investors who must access protected quotations because access fees are being reduced to amounts above the exchanges' net capture rates.

Exchanges are the only trading centers that currently display protected quotes in the national market system, and they play an important role in bringing together multiple buyers and sellers of securities.[592] Exchanges are also responsible for certain important processes in the national market system, including openings, re-openings, and closings on the primary listing market; trading halts; initial public offerings and exclusively listed securities. The exchanges, along with FINRA, are also responsible for producing data for the consolidated market data feeds as well as the operation of the exclusive SIPs. In addition, the Commission has recognized these functions as "critical" to the operation of the securities markets for purposes of imposing requirements under Regulation SCI, which established a regulatory framework for oversight of the core technology of the U.S. securities markets.[593] Therefore, it continues to be appropriate to

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590 See Regulation NMS Adopting Release, supra note 4, at 37545. For the reasons discussed, the new access fee caps will continue to "provide the necessary support for the proper functioning of the Order Protection Rule, and private linkages, while leaving trading centers otherwise free to set fees subject only to other applicable standards (e.g., prohibiting unfair discrimination."). Id.

591 See infra section VII.D.2.b. As discussed below, the fees charged by ATSs for execution services are often in the range of 10 mils. See infra section VII.C.2, note 1118 accompanying text.

592 Rule 610(c) imposes the access fee caps on trading centers, which are defined to include other types of entities that can display protected quotes, including ATSs, OTC market makers and any broker or dealer that executes orders internally. 17 CFR 242.600(b)(106).

593 Securities Exchange Act Release No. 73639 (Nov. 19, 2014), 79 FR 72252 (Dec. 5, 2014) at 72277 (Final Rule "Regulation Systems Compliance and Integrity").

consider the impact on this business model, i.e., the agency market business model, when considering amendments to the access fee caps.

d. Comments on the Proposed 10 mils Access Fee Cap

There was divergence of opinion around the appropriate level of the access fee cap for protected quotations priced at $1.00 or greater.[594] A number of commenters viewed 10 mils as the appropriate level.[595] Commenters stated that a reduction in the level of the access fee cap to 10 mils is warranted because, among other reasons, it will result in lower costs to investors to access protected quotes;[596] align access fees with other elements of investor transaction costs (all of which have decreased);[597] recalibrate the access fee cap levels to reflect increased efficiencies, technological advancements and structural changes in the markets since Rule 610(c) was adopted;[598] continue to allow for competitive business models and innovation;[599] and align on-exchange pricing more closely with off-exchange venues such as ATSs.[600] One commenter

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594 See, e.g., supra notes 460, 463, 466 (recommending a reduction in fee cap to $0.0015).

595 See, e.g., ASA Letter at 5 (strongly supporting 10 mils access fee cap for all NMS stocks); Better Markets Letter I at 16; BlackRock Letter at 10-11; BMO Letter at 3-4; Brandes Letter at 3; Boston Partners, Calamos Advisors, Glenmede Investment, and Janus Henderson Letter; Budish Letter; Capital Group Letter at 4; Council of Institutional Investors Letter at 3; IEX Letter IV at 1; Healthy Markets Letter I at 24; Ontario Teachers et al. Letter at 1-2; Themis Letter at 7-8; Vanguard Letter at 2 & 6; Invesco Letter at 2 and 4; JPMorgan Letter at 6; NASAA Letter at 9; Pragma Letter at 7; XTX Letter at 5; and Verret Letter II. See also supra note 422.

596 See, e.g., Ontario Teachers et al. Letter at 2; ASA Letter at 5; Council of Institutional Investors Letter at 3; Better Markets Letter I at 16.

597 IEX Letter VI at 1-2.

598 See, e.g., Ontario Teachers et al. Letter at 1-2; Brandes Letter at 3; Invesco Letter at 4; Vanguard Letter at 6; Verret Letter I at 5; Verret Letter III at 4-5; Letter from John Ramsey, Chief Market Policy Officer, IEX, dated Feb. 23, 2024 ("IEX Letter V") at 2-3; IEX Letter VI at 4.

599 See, e.g., Proof Letter at 1; BMO Letter at 4; Verret Letter I at 9; Ontario Teachers et al. Letter at 1-2; Verret Letter III at 22.

600 See, e.g., RBC Letter at 4; BlackRock Letter at 11; Verret Letter I at 7; Verret Letter III at 4-5; IEX Letter V at 5; IEX Letter VI at 5. But see Letter from Kevin R. Edgar, Partner, Baker & Hostetler LLP, dated Feb. 7, 2024, ("Equity Markets Association Letter") at 2 (stating "alleg[ations] . . . that access fees are excessive, both in an absolute sense and relative to ATSes" are improper and further stating there is "no

stated a 10 mil cap "would have the added benefit of aligning exchange fees with prevailing ATS fees and creating a more equitable competitive landscape across trading venues"[601] and another stated that "[t]he economic difference to a broker between routing to an . . . ATS [ ] versus an exchange would be much smaller than it is today, if a $.0005-$.0010 access fee cap replaces the current $.0030 mil cap."[602] According to one commenter, lowering the cap to 10 mils should "(1) lead to an increase in investor interaction with displayed quotes, (2) provide an economic reason for all participants to submit displayed quotes to an exchange, and (3) end the corrosive and discriminatory nature of the current exchange fee and rebate system."[603] Another commenter stated that reducing the level of the cap from 30 mils to 10 mils would "remove barriers to entry for new market participants," especially smaller trading firms and retail investors.[604] Further, commenters stated that the proposed reduction of the access fee caps would be beneficial to retail investors, as well as institutional investors and long-term investors.[605]

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basis for such conclusions other than by making bald assumptions about exchanges' costs. . . . [N]et transaction fees are far lower on exchanges than they are on ATSes."); Nasdaq Letter III at 3 (stating commenters' analysis of ATS-Ns revealed "large variations among ATS fees and some of them are similar or higher than exchange fees. . . including fees as high as $0.06); Nasdaq Letter IV at7-8 (providing data regarding range of ATSs minimum/maximum fees and stating ATS fees are highly variable and 10 mils is not representative of transaction fees on or off exchanges).

601 BlackRock Letter at 11.

602 RBC Letter at 4.

603 ASA Letter at 5.

604 See Verret Letter I at 9; Verret Letter III at 22. But see Letter from Barbara Comstock, Executive Director, American Consumer and Investor Institute, dated June 1, 2023 ("ACII Letter I") at 6 (commenting generally that fundamental changes to existing market structure could roll back innovations that have "opened up today's markets to millions of new and diverse investors."); NASP Letter at 2 (commenting generally that proposed NMS changes could harm retail investors by "making the process of buying and selling stock more difficult and potentially reinstating barriers to entry"); Nasdaq Letter II at 2-3 (stating "the cost of access fees has actually fallen since 2005 by one-third" and "the burden of access fees relative to the all-in trading costs of participants has not grown over time; instead, it has remained relatively flat.").

605 See, e.g., Council of Institutional Investors Letter at 3; Ontario Teachers et al. Letter at 2; Themis Letter at 8; IEX Letter IV at 13, 23; Better Markets Letter I at 16.

Several commenters stated their support for reducing the amount of the access fee caps, but cautioned that further analysis is necessary to determine the appropriate amount and parameters of any reduction to avoid unintended consequences.[606] The Commission disagrees for a number of reasons. Further delay is not warranted because the access fee caps have been extensively considered for many years.[607] In addition, the Commission has weighed several factors in determining to reduce the access fee caps to 10 mils and, as discussed further below in the Economic Analysis, concludes that this reduced level appropriately accommodates various competing interests.[608] The adopted level of 10 mils for access to protected quotes priced $1.00 or more reflects the views of many commenters to the Proposing Release[609] and has been suggested by market participants in other contexts.[610] Further, as discussed above, a 10 mil cap strikes an appropriate balance between reducing the cap to help to address distortions in the market associated with the preexisting fee caps, while also preserving the ability of the national securities exchanges to continue to operate with their current net capture rates.[611] Finally, the Commission has reviewed the fees charged by trading centers that do not have protected quotes so do not have an incentive to charge excessive fees to market participants required to access

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606 See, e.g., STA Letter at 7-8; ICI Letter I at 16; Nasdaq Letter I at 2 and 19.

607 See supra notes 362 and 364.

608 See infra section VII.D.2.

609 See supra note 595.

610 See Goldman 2018 Letter at 1-2 (stating commenter's support for reducing the access fee cap to $0.0010 because a 10 mil cap would be calibrated with then-present-day [2018] trading and execution costs, would better ensure displayed prices reflect the actual economic costs of an execution, and would allow exchanges to continue maintain their current net capture rates, while also choosing to offer rebates to incentivize liquidity provision if they chose to do so). Further, the EMSAC also considered, among other things, whether the access fee cap should be modified. See supra note 4.

611 See infra section VII.D.2.

protected quotes and 10 mils is consistent with the range of rates assessed by such trading centers.[612]

Other commenters recommended applying different access fee caps depending on the liquidity profile of a particular security.[613] Further, some commenters suggested specific alternative models and/or levels of access fee caps.[614] A few commenters stated that the access fee caps should be expanded to cover full depth-of-book quotations[615] or auctions.[616] However, one commenter disagreed with these concerns and stated that "the fee cap has been equally applied to all stocks regardless of price, spread, or trading volume since it was enacted" and further stated that "[e]xchange processing costs are exactly the same" regardless of these varying characteristics.[617]

As discussed above, the access fee caps under Rule 610 establish the upper limit for fees that trading centers can charge for access to protected quotations. The access fee caps do not apply to depth-of-book quotations or auctions because these are not protected quotations. As discussed throughout, the access fee caps are designed to preserve fair and efficient access to

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612 See infra note 1118. The Commission acknowledges variability within the rates assessed by ATSs, with some transactions subject to fees above 10 mils and some below 10 mils based on attaining certain levels of volume as well as other variability within the fee schedules. Commenters have stated that the fees they experience are often in the range of 10 mils, which is informative in considering an appropriate level of the access fee caps because such statements reflect the current market rate paid for execution services as reported by participants. See infra notes 658-659 and accompanying text.

613 See, e.g., BlackRock Letter at 10-11; T. Rowe Price at 4-5; Citigroup Letter at 5-6.

614 See, e.g., MEMX Letter at 3 and 24-28; Nasdaq Letter I at 19; William O'Brien, Former CEO, Direct Edge, dated Apr. 13, 2023 ("O'Brien Letter") at 5; Optiver Letter at 3.

615 See, e.g., Citadel Letter I at 25; FIA PTG Letter II at 3.

616 MEMX Letter at 3, 24-28.

617 IEX Letter VI at 3. This commenter further stated that the "benefits that exchanges have received from technological advances and increased efficiencies in determining their own costs to process orders . . . apply exactly in the same way for trading in all classes of securities" and therefore retaining a uniform, lower "fee cap across all stocks (priced greater than $1.00 per share) avoids further complexity to trading decisions from fees that can vary for the same stock based on changes in the applicable tick size." Id.

protected quotations, regardless of the liquidity profiles of NMS stocks. Trading centers are able to develop different fee structures within this construct and in a manner that is consistent with the Exchange Act. The Commission is not setting the access fee caps to a specific percentage of the minimum pricing increments in part because they address different regulatory objectives. An important objective of an access fee cap (to preserve access to protected quotes) is distinct from an objective of tick size (e.g., to prevent stepping ahead of displayed orders).[618] However, as discussed above, because the Commission is reducing the minimum pricing increment under Rule 612, it is also reducing the levels of the access fee caps to prevent the distortions that would occur if an access fee is more than one half of the tick.[619]

Further, amending Rule 610 to adopt variable caps to reflect different liquidity profiles of different stocks would expand and change the objective of the rule, which is to ensure the fairness and accuracy of protected quotations by establishing an outer limit on the cost of accessing such quotations.[620] The access fee caps were not designed to establish fees for executions, they were designed to limit the amount of fees that can be charged for access to the best priced quotes in the national market system. Trading centers may adopt fees (and rebates) to incentivize trading in NMS stocks with different liquidity profiles in a manner consistent with the Exchange Act, including the limits imposed by the access fee caps.

Another commenter stated that there is no valid basis to support a claim that the current fee cap is excessive.[621] This commenter stated that the Commission did not substantiate reduced

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618 See supra section III.A and section III.C.1.

619 See infra section VII.D.2.a and notes 1419 and 1425.

620 See also note 351.

621 Nasdaq Letter III at 2.

costs as a justification for lowering the access fee caps.[622] This commenter also stated that, "the Commission present[ed] no cost-based methodology for arriving at the levels of access fee caps it proposes"[623] and therefore the proposed caps are "arbitrary and capricious" because the caps do not "bear a reasonable relationship to the actual costs of executing trades on the exchanges."[624] The commenter further stated that "[t]echnology costs, and improvements thereto, are not significant determinants of access fee levels."[625] Further, this commenter also stated that "exchange platform costs" (i.e., the constellation of related services of which transaction services are only one part) to market participants have "remained competitive over time."[626] Finally, according to this commenter, "access fees and rebates represent more than the simple economic costs to an exchange of effecting a trade; they also reflect the value of the information that quotes provide to the market, and the value to participants of having access to those quotes."[627] Another commenter stated that the current cap was "rather arbitrarily selected" and in its view has "resulted in continued industry disagreement."[628]

However, another commenter disagreed, stating "the current access fees are unreasonably high when taking into consideration the lower exchange costs stemming from increased

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622 See Nasdaq Letter I at 21; Nasdaq Letter II at 4. This commenter stated that "determining such costs and setting appropriate rates based upon those costs are inherently difficult" and further stated that "a government agency like the Commission is ill-suited to tackle [such a task]" and should refrain from doing so. Nasdaq Letter I at 22. See also Cboe Letter III at 5; Nasdaq Letter III; Equity Markets Association Letter at 2.

623 Nasdaq Letter II at 4-5.

624 Nasdaq Letter II at 4. See also Nasdaq Letter III at 2; Nasdaq Letter I at 22.

625 Nasdaq Letter II at 4. See also Nasdaq Letter III at 2.

626 Nasdaq Letter II at 4-5.

627 Nasdaq Letter I at 21; Nasdaq Letter II at 4.

628 Cboe Letter II at 8.

efficiencies and technology advancements that have occurred since 2005."[629] Although other trading costs have decreased, access fees have not and, according to this commenter, such fees "now represent an outsized portion of transaction costs."[630] The commenter further stated it was appropriate for the Commission to rely on reduced costs to justify the reduction in the access fee cap.[631] The commenter stated because "the 30-mil cap exceeds the typical cost to trade on non-protected venues, it encourages investors to seek alternatives to accessing displayed quotes" which drives order flow to off-exchange venues.[632]

As discussed throughout this release,[633] market participants have stated that the access fee caps are outdated and no longer reflect the current market structure. One commenter stated that the Commission, by identifying that the markets have changed due to market innovations and technological efficiencies and that transaction and trading costs had been reduced, and providing statements of market participants to support this statement,[634] was suggesting that the access fee cap "no longer bears a reasonable relationship to the actual costs of a trade."[635] This misconstrues the Commission's statement recognizing that the markets are different than they were in 2005. Under the preexisting access fee caps, fee and rebate structures have developed

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629 IEX Letter IV at 8. See also Better Markets Letter I at 16 ("There is certainly no economic justification in terms of defraying the exchanges' costs of processing and matching trades, as those costs have dropped with the advent of advances in technology."); Verret Letter III at 13 ("Access fees charged to broker-dealers and other market participants simply to access liquidity on certain exchanges often greatly exceed the actual costs associated with providing that liquidity access.").

630 IEX Letter IV at 8. See also Goldman Sachs 2018 Letter at 1-2.

631 See IEX Letter IV at 6.

632 IEX Letter IV at 8.

633 See, e.g., supra section IV.B.2.

634 See Proposing Release, supra note 11, at 80290 n.293.

635 Nasdaq Letter I at 21. See also Nasdaq Letter II.

such that access fees are predominantly used to pay rebates to liquidity providers and these structures have resulted in distortions in the market.

The Commission considered many factors and the views of commenters, and balanced competing factors when it adopted the original fee caps in 2005.[636] Likewise, as discussed above, the Commission again has considered and balanced many factors,[637] including the effects on liquidity and trading costs for market participants[638] in coming to the determination that the 10 mils access fee cap is appropriate for all protected quotations priced $1.00 or more.[639] As discussed throughout this release, the Commission has reduced the caps to a level that is sufficient to mitigate the market distortions associated with the fee schedules that have been developed under preexisting access fee caps and to accommodate the new minimum pricing increments under amended Rule 612, while also preserving the viability of the agency market business model.[640]

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636 See generally, Regulation NMS Adopting Release, supra note 4.

637 See supra note 608 and surrounding text.

638 See infra section VII.D.2.c (analyzing the effects of rebates for providing liquidity).

639 Several commenters stated that access fees under the preexisting caps have become a larger portion of overall transaction costs because such costs have decreased significantly since the access fee cap levels were established almost two decades ago. See, e.g., infra notes 1438-1441 and accompanying text and supra 364 and 365 and supra notes 597-598 (describing reasons why costs have decreased). The Commission has considered costs, and specifically commenters' concerns relating to costs, as one of several factors in its analysis and determination that a 10 mils access fee cap is appropriate. As the Commission stated in 2005, reaching appropriate policy decisions in a complex area such as fees for access to the best quotations displayed in the national market system requires balancing policy objectives that sometimes may not point in precisely the same direction. See Regulation NMS Adopting Release, supra note 4, at 37498.

640 See supra section IV.D.1.c. and infra section VII.D.2.b.

Most exchanges provide access to protected quotations and retain an estimated net capture of 2 mils.[641] However, as discussed below,[642] a net capture of 2 mils is not uniform across all exchanges and some have an estimated net capture that is higher than 2 mils.[643] This suggests that the preexisting levels of the access fee caps are higher than necessary to preserve the viability of the agency market business models. The adopted level of 10 mils for access to protected quotes priced $1.00 or more is appropriate because it will allow trading centers to continue to provide access to protected quotations and retain a net capture to fund their transaction services. Recalibrating the level of the cap with a consideration of current market rates to provide execution services is appropriate and consistent with how the Commission set the preexisting rates.[644]

Finally, as stated above, the access fee caps were not developed as a means to enable the payment of rebates. However, under the preexisting access fee caps, access fees are predominantly used to fund the rebates paid to liquidity providers. As also stated above and discussed further below, liquidity providers are able to post bid and offer prices that account for the risk of displaying protected quotations without needing the payment of a rebate.[645]

In deciding to adopt a single 10 mil fee cap for all protected quotes in NMS stocks priced $1.00 or more, the Commission has also considered the rates charged by other agency markets for access to non-protected quotation liquidity because such trading centers are not subject to the

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641 See supra section IV.D.1.c. and infra sections VII.C.2 and VII.D.2.b and notes 1101 - 1103 and accompanying text. As discussed below in the Economic Analysis, the Commission estimates for purposes of this release that exchange net capture is 2 mils, while also recognizing that net capture can range from approximately 2 to 6 mils. See infra note 1103.

642 See id.

643 See id.

644 See infra note 357 and discussion below.

645 See supra section IV.B.2.b. See also infra section VII.D.2.c and note 1458 and accompanying text.

preexisting 30 mils access fee cap and therefore the rates for execution services established by such markets are subject to competitive market forces that are not capped.[646]

One commenter stated that ATS fees are not a good benchmark to determine the appropriate level of exchange access fees because, in their view, exchange access fees should be higher than off-exchange venues' access fees.[647] This commenter stated that "[e]xchange access fees compensate for the risk associated with posting lit quotes as well as the value associated with accessing immediate liquidity."[648] In addition, according to this commenter, exchange pricing is "designed to attract quotes, whereas ATS pricing is designed only for trades" and ATSs "leverage lit quotes" produced by exchanges to determine ATS's transaction pricing.[649] Finally, this commenter stated that the rates charged by off-exchange venues "vary significantly in structure, functionality, and fees" to the extent they are actually known publicly and disagreed with the conclusion that "10 mils is a representative fee for accessing liquidity off exchange."[650]

Other commenters disagreed.[651] According to one commenter, certain ATSs provide specialty services such as block trading and the ability to use conditional order types to achieve

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646 See infra notes 1116 - 1118 and accompanying text.

647 Nasdaq Letter IV at 8.

648 Nasdaq Letter IV at 8.

649 Id.

650 Nasdaq Letter IV at 7. This commenter further stated "nothing beyond anecdotal reports suggests that 10 mils is a representative fee for accessing liquidity off exchange." Id.

651 See, e.g., IEX Letter VI at 5 (stating "ATSs that accept and process orders for NMS stocks in the same way as exchanges do characteristically charge in the range of 10 mils per share."); BlackRock Letter at 11 (stating that 10 mil cap "would have the added benefit of aligning exchange fees with prevailing ATS fees and creating a more equitable competitive landscape across trading venues"); Verret Letter I at 7 (lowering access fee cap from 30 mils to 10 mils would be "more in line with the fees charged by most ATS platforms,"); IEX Letter V at 5 (stating because ATS fees "are affected by market forces and not pegged by regulation, they are highly relevant to the question of where to set an updated fee cap."). See also Letter from Stacey Cunningham, President, NYSE, to Brent Fields, Secretary, Commission, dated Oct. 2, 2018 (commenting on File No. S7-05-18 "Transaction Fee Pilot for NMS Stocks") (stating reducing the access fee cap to 10 mils will bring the access fees exchanges charge to remove liquidity in line with the rates charged by ATSs).

certain trading strategies, and typically charge higher than 10 mils for such specialized services.[652] However, according to this commenter, ATSs that operate a continuous book market are similar to exchanges that provide similar services and those ATSs charge "a maximum rate of 10 mils" for such services and such venues collectively represent approximately 42% of all ATS volume during 2023.[653] According to this commenter, "this data is strong evidence that the standard comparative rate for immediate access to liquidity in NMS stocks on ATSs that offer this [continuous book] service is, in fact, 10 mils per share."[654] This commenter further stated that exchanges are "able to charge higher prices than other markets, precisely because of the 'protected quote' status" which is "what the SEC sought to prevent in 2005, in furtherance of the statutory goal of fair distribution of quotation information."[655]

The fees charged by many ATSs that provide execution services similar to exchanges are often reflected in a range and sometimes are based on volume transacted, and ATSs typically do not pay rebates.[656] As stated above, several commenters stated that a 10 mils access fee cap would be consistent with the access fees charged by ATSs.[657] These statements are informative in considering an appropriate level of the access fee caps because they reflect the current market

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652 IEX Letter VI at 5-6; IEX Letter V at 5-6.

653 IEX Letter VI at 5 (referencing public data showing ATS access fees in the range of 10 mils and below). See also IEX Letter V at 5-6.

654 IEX Letter VI at 5 (stating 10 mils is the relevant comparative rate charged by ATSs).

655 IEX Letter IV at 6. But see Nasdaq Letter V at 2 (stating "ATSes enjoy advantages [including the ability to segment order flow] that would persist, and likely increase, with a lower cap on access fees.").

656 See infra sections VII.C.2.b and VII.D.2, note 1118 and accompanying text. See also Proposing Release, supra note 11, at 80314 (stating a review of form ATS-Ns on which ATSs provide a range of the fees charged shows such fees are often in the range of 10 mils).

657 See supra note 651.

rate paid for execution services as reported by market participants.[658] This, in concert with the net capture rates discussed above, suggests that the current access fee caps may not be consistent with current market rates for providing execution services.[659]

Considering the rates charged by trading centers is consistent with the analysis the Commission conducted to determine the appropriate level of the preexisting access fee caps when it adopted them. Specifically, the Commission considered the access fees charged by ECNs and other types of trading centers, including self-regulatory organizations ("SROs"), when it adopted the preexisting 30 mil access fee cap to gain insight into the then current market rates for execution services.[660] At the time of adoption in 2005, the $0.0030 fee limitation was based on the then-prevailing market rates for execution services and general business practices, as very few trading centers charged fees in excess of that amount.[661] As it did in 2005 in establishing the preexisting fee caps, to determine the appropriate level of the amended access fee caps, the Commission has similarly considered the current market rate for execution services as measured by the rates charged by other trading centers as a factor in considering the level of the adopted

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658 See, e.g., IEX Letter I at 22-23; IEX Letter IV at 14-15; IEX Letter V at 5-6; BlackRock Letter at 11; Verret Letter II at 4. See also Letter from Stacey Cunningham, President, NYSE, to Brent Fields, Secretary, Commission, dated Oct. 2, 2018 (commenting on File No. S7-05-18 "Transaction Fee Pilot for NMS Stocks") (stating reducing the access fee cap to 10 mils will bring the access fees exchanges charge to remove liquidity in line with the rates charged by ATSs). According to one commenter, "the rates charged by ATSs to access liquidity allow comparison to market-based prices that are not affected by prices imposed by exchanges to access protected quotes . . . [and] an informal survey of ATS operators indicates that the standard access fee charged by most ATSs is approximately 10 mil."). See also supra note 651 and accompanying text.

659 See Letter from Theodore R. Lazo, Managing Director & Associate General Counsel, SIFMA, to Brent J. Fields, Secretary, Commission, dated Mar. 9, 2017, at 8 (stating ''a significant portion of access fees are used to subsidize rebates with the exchanges' net capture reflecting today's market norms for accessing liquidity, which is approximately 3–5 cents per 100 shares traded . . . or 3–5 mils.).''

660 See Regulation NMS Adopting Release, supra note 4, at 37545.

661 See Regulation NMS Adopting Release, supra note 4, at 37545 (stating that the $0.0030 per share cap largely codified the then-prevailing fee level set through competition among the various trading centers).

access fee caps.[662] This factor is useful in calculating the level of the access fee caps, but it is not the only factor. The Commission is balancing the need to set a level of the access fee caps to allow for fair and efficient access while also seeking to ensure that trading centers are not impaired in their ability to provide execution services.

e. Protected Quotes Priced under $1.00

With respect to the access fee cap for protected quotations priced under $1.00, one commenter stated its view that "the negative impact of the proposed access fee caps is much more pronounced for securities priced less than $1.00."[663] The commenter stated that for protected quotations priced less than $1.00, the "estimated revenue impact to exchanges providing rebates in these securities [those priced below $1] is not insignificant" and that "the access fee cap must remain unchanged to support competition, differentiation, and liquidity provision."[664] This commenter also stated that "[s]implistic proportionality is not a sufficient justification for this reduction" and instead "[a]nalysis of whether there will be proportionate outcomes is necessary to overcome the arbitrary and capricious nature of this reduction."[665] Finally, this commenter stated that the reduction would "likely impact exchanges' ability to differentiate, as well as materially limit the transaction revenue that exchanges apply towards developing innovative solutions that contribute to the robustness of the U.S. marketplace."[666]

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662 See supra note 357 and infra section VII.D.2.

663 Cboe Letter II at 9. The Commission conducted similar analysis when it adopted preexisting Rule 610(c), and as discussed below, having different access fee caps apply to a bid that is priced under $1.00 and an offer that is priced over $1.00 in the same NMS stock would create pricing distortions. See infra section VII.D.2.c.

664 Cboe Letter II at 9.

665 Cboe Letter II at 9.

666 Cboe Letter II at 9.

One commenter stated that reducing the access fee cap generally would reduce the disincentive to trade on exchanges because costs would be lower.[667] Another commenter stated that the estimated loss in net capture due to the reduction in the access fees for protected quotation priced below $1.00 "will not harm the major exchanges."[668]

The Commission is adopting a modified access fee cap of 0.1% of the share price for protected quotations priced under $1.00. The Commission proposed a lower access fee cap of 0.05% of the quotation price per share in light of the proposed 5 mils access fee cap. Since the 5 mils access fee cap is not being adopted, the Commission has modified the access fee cap for protected quotes priced under $1.00 so that it is consistent with the 10 mils access fee cap for protected quotes priced $1.00 or more.

The adopted 0.1% access fee cap will align this cap with the 10 mils access fee cap that will apply to protected quotations in NMS stocks priced $1.00 or greater.[669] This alignment is consistent with the access fee caps that apply under the preexisting rule, which are 30 mils and 0.3% respectively. Alignment of the access fee caps for protected quotations in NMS stocks priced below $1.00 and those priced $1.00 and above is necessary to preserve continuity at the $1.00 cutoff to ensure that cost to access a protected quote for an NMS stock that is priced below $1.00 is not more compared to the cost to access a protected quote for the same NMS stock that is priced $1.00 or more.[670] For example, an NMS stock could have a protected bid that is priced

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667 Better Markets Letter I at 16.

668 Themis Letter at 7.

669 See infra section VII.D.2.c. As the price of a stock moves across the $1.00 cutoff, its access fee would not experience a discontinuous jump because 0.1% of $1.00 is 0.1 cents, i.e., 10 mils. Such alignment prevents the anomalous result that could occur if the NBB was priced under $1.00 and the NBO was priced over $1.00 and each protected quote would be subject to a different access fee.

670 See also infra section VII.D.2.c.

below $1.00 and a protected offer that is priced above $1.00. If the access fee cap for protected quotes priced below $1.00 remained at the preexisting level, the access fee for the protected bid would be almost three times higher than the access fee for the protected offer.[671] In such an instance, it would cost more to trade against the bid than to trade against the offer and negatively impact incentives for accurate price formation.[672]

The Commission understands that reducing the access fee cap for stocks priced below $1.00 could reduce exchange revenue.[673] This is because exchanges typically charge the maximum fee of .3% for accessing protected quotes priced less than $1.00 and do not offer rebates, or offer rebates in small amounts.[674] Accordingly, exchanges typically retain the full amount of the access fee charged. However, in order to prevent the distortions that would occur if a higher access fee cap were applied to protected quotes priced less than $1.00, the Commission is adopting the percentage cap that is aligned with the access fee cap that is applicable to protected quotes priced $1.00 or more to preserve continuity at the $1.00 cutoff.

f. Comments on Implementation

Some commenters stated that the Commission should build in an evaluation process to assess the benefits and any potential degradations to market quality resulting from changes to the access fee caps.[675] One commenter stated that the rule should "include a mechanism in the rule to periodically re-evaluate the access fee caps set in the proposal to ensure that access fee levels

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671 See also infra section VII.E.2.b.

672 See also infra section VII.D.2.c.

673 See Table 14, infra section VII.D.2.b.

674 See infra note 1433 and accompanying text.

675 See, e.g., Citigroup Letter at 6; NASAA Letter at 9; MEMX Letter at 41; Nasdaq Letter I at 2; and Nasdaq Letter IV at 12.

continue to have the anticipated benefits."[676] Others recommended application of the new access fee caps to a smaller subset of NMS stocks before rolling it out to all NMS stocks.[677] One commenter stated that changes to access fees should be adopted as part of a pilot to allow for a study of the effects on market quality.[678] Another commenter stated the Commission should first collect more data and industry input and conduct further analysis to determine the optimal access fee cap levels before proceeding.[679] One commenter, however, disagreed that any delay to collect further data or conduct additional analysis was warranted.[680] According to this commenter, there is a "mountain of evidence supporting a reduction in the access fee cap from current levels" and "general consensus in favor of reducing the cap."[681]

The Commission disagrees with commenters' suggestions that further study be conducted before adopting the amendment or that the amendment should be incrementally rolled out. A delayed or incremental approach to reducing the preexisting access fee caps would delay the benefits to investors of the reduced caps. The Commission has extensively considered the adopted amendments, reviewed all comments letters and conducted extensive economic analysis in deciding to adopt this amendment. The amended access fee caps will provide savings for investors and should be implemented.

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676 NASAA Letter at 9.

677 See, e.g., STA Letter at 8; State Street Letter at 5; CCMR Letter at 27; GTS Letter at 6-7; Nasdaq Letter I at 30.

678 CCMR Letter at 27.

679 See, e.g., T. Rowe Price Letter at 3-5. See also SIFMA Letter II at 39-40; Chamber of Commerce Letter at 1; Cboe, State Street, et al. Letter at 3; Citadel Letter I at 24-25.

680 See IEX Letter III at 4 ("There is clear evidence that the 30-mil 'limit' has acted to keep access fees artificially high, leading to price distortions and increasing costs to institutional investors in particular.").

681 IEX Letter III at 4. See also Verret Letter II at 4; IEX Letter III.

E. Final Rule 610(d) Requiring That All Exchange Fees and Rebates Be Determinable at the Time of an Execution

Many exchange fees and rebates are calculated at the end of the month, which impedes the ability of market participants, including investors, to understand at the time of execution the full cost of their transaction. For example, the exchanges have developed complex fee and rebate schedules, some of which include tiers or other incentives based on a market participant's relative monthly trading volume or relative volume compared to the consolidated trading volume in the current month, with higher volume tiers receiving a higher (lower) per unit rebate (fee). This means that the exact fee or rebate amount for an order cannot be determined until the end of the month, after an execution occurs, and is not known to the parties to the trade at the time of execution. Further, uncertainty regarding the fee amount at the time of execution can hinder the ability of market participants to conduct best execution analyses and can affect order routing decisions.

To provide further transparency regarding transaction pricing, the Commission proposed to amend Rule 610 to add a new subsection (d) "Transparency of Fees," which would prohibit a national securities exchange from imposing, or permitting to be imposed, any fee or fees, or providing, or permitting to be provided, any rebate or other remuneration (e.g., discounted fees, other credits, or forms of linked pricing) for the execution of an order in an NMS stock unless such fee, rebate or other remuneration can be determined by the market participant at the time of execution. As the Commission explained in the Proposing Release, under proposed Rule 610(d), any national securities exchange that imposes a fee or provides a rebate that is based on a certain volume threshold, or establishes tier requirements or tiered rates based on minimum volume thresholds, would be required to set such volume thresholds or tiers using volume achieved

during a stated period prior to the assessment of the fee or rebate so that market participants are able to determine what fee or rebate level will be applied to any submitted order at the time of execution.[682] For example, if an exchange proposed a lower fee for members that reach a certain level of trading volume in a month, the required level of trading volume would have to be achieved based on a month prior to the imposition of the fee or payment of the rebate.[683]

The Commission has considered commenters' views (as discussed below) and is adopting Rule 610(d) as proposed. Investors can use this information to assess their broker-dealer's routing decisions and such information will help to inform market participants' best execution analysis.

1. General Comments

The Commission received comments from a broad range of commenters who stated that proposed Rule 610(d) would provide enhanced transparency surrounding transaction fees and rebates[684] and alleviate concerns related to potential conflicts of interest.[685] One commenter

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682 National securities exchanges establish and amend their fee schedules by filing proposed fee rule changes, pursuant to section 19(b) of the Exchange Act and rule 19b-4 thereunder, for Commission review. National securities exchange fee schedules are posted on their websites. See Rule 19b-4(l). Some national securities exchanges currently use volume calculated on a monthly basis to determine the applicable threshold or tier rate. See, e.g., fee schedules of Nasdaq PSX available at https://www.nasdaqtrader.com/Trader.aspx?id=PSX_pricing (as of Mar. 2024) (calculating fees based on "average daily volume during the month") and Cboe EDGA available at https://www.cboe.com/us/equities/membership/fee_schedule/edga/ (as of Mar. 2024) (calculating fees based on "average daily volume" and "total consolidated volume" on a monthly basis).

683 This amendment to Rule 610 does not alter an exchange's ability to determine the measurement period during which volume is calculated (e.g., a week prior, two weeks prior, or prior monthly), rather the rule will instead require the measurement period to be prior to the date of execution so that market participants can determine the amount of the fee at the time of execution.

684 See, e.g., Ontario Teachers et al. Letter at 2; ASA Letter at 6; Angel Letter at 8; Letter from Kelvin To, Founder and President, Data Boiler Technologies, LLC, dated Apr. 12, 2023 ("Data Boiler Letter II") at 3 (agreeing with Angel Letter); Citigroup Letter at 6; BMO Letter at 4; Council of Institutional Investors at 4. See also Comment Letter Type H, available at https://www.sec.gov/comments/s7-30-22/s73022.htm.

685 See, e.g., BMO Letter at 4; NASAA Letter at 9.

stated that proposed Rule 610(d) would "shed greater transparency on the use of fee and rebate tiers and their impact on individual trades" and "help to address concerns related to conflicts of interest[ ] because . . . investors will be in a better position to identify and seek the recovery of rebates that accrue specifically to their orders . . ."[686] Further, one commenter stated that such a change is "a great step forward and long overdue,"[687] and another commenter stated that it would be "a positive outcome for the industry and investors and w[ould] reduce market complexity and increase transparency."[688] One commenter stated that Rule 610(d) "has the potential to facilitate broker-dealers in passing-through access fees and rebates to their customers, and in doing so, it could alleviate concerns [ ] about perceived conflicts-of-interest associated with the maker-taker model and the provision of exchange rebates to broker-dealers."[689]

Other commenters' support for Rule 610(d) was more measured because they stated that the proposal did not go far enough to address market distortions resulting from fee and rebate tiers.[690] One such commenter stated that although it was "encouraged about eliminating the retroactive attributes of exchange volume tiers," it felt a "more optimal solution [ ] would be to remove them entirely"[691] because "exchange volume tiers create barriers to entry that only

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686 IEX Letter I at 28-29. See also Letter from Stanislav Dolgopolov, Chief Regulatory Officer, Decimus Capital Markets, LLC, dated Mar. 31, 2023, at 3 ("Decimus 2023 Letter").

687 Angel Letter at 8. See also BMO Letter at 4; Healthy Markets Letter I at 25.

688 Fidelity Letter at 15. See also ICI Letter I at 17.

689 Nasdaq Letter I at 32. See also Letter from Tyler Gellasch, President & CEO, Healthy Markets Association, dated Aug. 1, 2023 ("Healthy Markets Letter II") at 11.

690 See, e.g., RBC Letter at 5; ASA Letter at 5; IEX Letter I at 29; Letters from Kelvin To, Founder and President, Data Boiler Technologies, LLC, dated Mar. 31, 2023 ("Data Boiler Letter I") at 5; Themis Letter at 1 (expressing support for the proposal, but expressing disappointment that the Commission did not go further and calling for the elimination of rebates); Healthy Markets Letter I at 24 ("If two different brokers send the exact same order to an exchange, they should get the same pricing for that order. Pricing should be based on the order being sent, not the other business or trading by the party sending it.").

691 RBC Letter at 5. See also Proof Letter at 1-2 (supporting requiring exchange pricing to be computable at the time of the trade but questioning what, if any, impact this will have on complexity of existing pricing

benefit the largest, most active trading firms at the expense of smaller competitors."[692] One commenter stated its support for Rule 610(d), but also stated that the Commission should "take additional steps . . . to prohibit or restrict the use of CADV-based tiers," which in this commenter's view are "by their nature [ ] highly anti-competitive and discriminatory."[693] Further, one commenter "encouraged the Commission to review and address the issue of 'bespoke' pricing tiers prevalent in today's volume tiered pricing models."[694] Another commenter, while agreeing with the objective of fee transparency, was skeptical that Rule 610(d) "would 'materially reduce' uncertainty regarding the fee amount at the time of execution" and stated that the proposal would provide "little practical transparency for most Market Participants."[695]

Rule 610(d) will provide additional certainty, transparency and clarity to exchange fee structures, which will assist investors and other market participants in assessing their order placement. Further, certainty about the cost of a transaction at the time of the trade will help broker-dealers make more informed order routing decisions, particularly benefitting customers that are sensitive to transaction costs at the execution venue, because broker-dealers and their customers will know with more certainty the cost of an exchange transaction at the time of the

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tiers and expressing preference that the Commission adopt a "more drastic policy change."); IEX Letter I at 6.

692 RBC Letter at 5. See also Citigroup Letter at 6; Proof Letter at 1-2.

693 IEX Letter I at 29. See also Citigroup Letter at 6; John Ramsay, Chief Market Policy Officer, Investors Exchange LLC, dated Sept. 20, 2023 ("IEX Letter II") at 4; Healthy Markets Letter II at 3-6. However, not all commenters agree that volume-based fee/rebate tiers are anticompetitive. See, e.g., Cboe Letter III at 6-7 (arguing "volume-based tiers do not restrain trade or represent a burden on competition. . . By contrast, limiting volume-based rebate tiers would in fact harm competition and disadvantage the very small and mid-sized brokers who support this myth.").

694 BMO Letter at 4. See also Fidelity Letter at 15; Proof Letter at 1-2.

695 Pragma Letter at 7-8.

trade. Investors will be able to obtain or request at the time of execution details about the exchange fees and rebates assessed on their orders without having to wait weeks until that pricing is determined and invoiced.

In addition, because the rule will allow market participants to know the amount of fees and rebates that are applicable to their transactions at the time of the trade, the rule will facilitate the ability of broker-dealers to pass back to their customers, if the customer requests and the customer and the broker-dealer both are able to accommodate the pass-through of fees, rebates, and other forms of remuneration in a more timely fashion.[696] Today, lower fees or higher rebates based on volume achieved in a current trading month can lead to routing for purposes of achieving a certain level of volume or attaining a possible tier level rather than routing solely to achieve best execution. While tiers that are based on volume from a previous time-period may still incentivize routing by a broker-dealer to try to secure a higher rebate/lower fee tier in the following month, certainty regarding what tier applies at the time of trade will facilitate the ability of a broker-dealer to pass those fees and rebates through to their customers, if they so decide,[697] on a more timely basis because they will be known at the time of the trade.[698] Requiring certainty regarding the amount of the fee/rebate is an incremental step toward

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696 However, a broker-dealer may choose not to offer pass-through of fees, rebates and other forms of remuneration to its customers or may choose not to pass through the entirety of the incentive it receives, or the customer may not want or be able to accommodate such pass-throughs. In these cases, a conflict of interest would continue to exist between the broker-dealer and its customer when the broker-dealer routes the customer's order for execution based on the broker-dealer's economic benefit from its routing decision. Notwithstanding, even if pass-through of fees, rebates and other forms of remuneration to customers does not happen, Rule 610(d) will provide certainty regarding the applicable fee/rebate at the time of execution, which will facilitate a customer's ability to evaluate their broker's routing decisions and could improve broker-dealer accountability, provide greater transparency regarding executions and lead to improved order execution for customers. See infra section VII.D.3.

697 See id.

698 See infra section VII.D.3.

addressing commenters' concerns regarding the ability of exchanges and brokers to pass back the actual fee or report on each transaction.

If market participants pass through in their entirety the exchange fees/rebates to their customers, an ancillary benefit of the new rule will be that the potential inducement to broker-dealers to route orders based on garnering the highest rebate/paying the lowest fee will be reduced since a broker-dealer would no longer retain for itself the transaction pricing benefit from its routing decision. The new rule also will facilitate a customer's ability to obtain more timely information about what exchange transaction pricing the broker-dealer receives, which may increase accountability of the broker-dealer to the customer in ways that could lead to better order execution and more transparency regarding the fees/rebates applicable to a particular order.

Other commenters voiced support for the Commission's objectives in proposing Rule 610(d), but suggested certain modifications. One commenter stated that it "did not object in principle to . . . requir[ing] exchanges to set volume-based access fees and rebates as of the time of execution" provided other market centers would be held to "the same standards of transparency."[699] As discussed in the Proposing Release, exchange fees and the fees of non-exchange trading centers are treated differently under the federal securities laws.[700] Specifically, non-exchange fees are not subject to the requirements applicable to exchange fees under sections

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699 Nasdaq Letter I at 2, 31-32.

700 See Proposing Release, supra note 11, at 80287. If an ATS or OTC market maker displayed a protected quotation, its fees would be subject to the access fee caps under rule 610(c). However, exchange fees and the fees of non-exchange trading centers are treated very differently under the federal securities laws. For example, one of the distinguishing features of registered national securities exchanges is that—unlike non-exchange trading centers—their fees are subject to the principles-based standards set forth in the Exchange Act, as well as the rule filing requirements thereunder.

6(b) and 19(b) of the Exchange Act[701] and rule 19b-4 thereunder.[702] Exchange fees are subject to the requirements of the Exchange Act and the rules thereunder, which requires, among other things, that every exchange post and maintain a current and complete version of the entirety of each and every fee, due, and charge assessed by an exchange,[703] and that such exchange rules applicable to fees must provide for the equitable allocation of reasonable dues, fees, and other charges among its members and issuers and other persons using its facilities and not be designed to permit unfair discrimination between customers, issuers, brokers or dealers.[704] Rule 610(d) is consistent with that statutory framework as it provides members and their customers with more certainty and transparency at the time of trade when exchange transaction pricing may be relevant to, and impactful on, the broker-dealer's order routing decision. New Rule 610(d) is narrowly tailored to improve certainty and transparency regarding exchange fees and rebates within the current regulatory framework.

One commenter stated that the proposal might make it more difficult for smaller broker-dealers to compete against established firms because "participation in the exchanges' growth programs" might become more expensive in the initial month of participation and "limit exchanges' ability to incent market makers and other participants to quote at the NBBO and to do so in a large number of securities, including thinly-traded securities."[705] The commenter did not provide detail as to how these impacts would arise, but requested the Commission to "exempt

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701 15 U.S.C. 78(f)(b) and (s)(b).

702 17 C.F.R. 240.19b-4.

703 17 C.F.R. 240.19b-4(m)(1).

704 15 U.S.C. 78f(b)(4) and (5). See also Proposing Release, supra note 11, at 80287.

705 Nasdaq Letter I at 33.

growth programs and special pricing programs that reward market makers and other participants for quoting at the NBBO and providing market quality" from the requirements of Rule 610(d).[706]

Finally, some commenters did not support proposed Rule 610(d) because they stated it would negatively impact the ability to incentivize liquidity provision, "disrupt[ ] existing economic incentives without justification,"[707] add "an unnecessary layer of complexity,"[708] and inappropriately "wade into the business of telling private companies how to charge their customers."[709] One commenter stated that "existing fee constructs such as volume-based pricing tiers are important tools that allow exchanges to compete with one another and with non-exchanges."[710] This commenter further stated that volume-based tiers are entirely consistent with the Exchange Act and vital tools exchanges use to "incentivize greater participation and improve liquidity and market quality."[711] Finally, one commenter stated that the Commission "include[d] no data [ ] showing this change would cure any harm, nor does it claim any anticipated benefits that might flow from this change."[712]

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706 Id. at 33.

707 Cboe Letter II at 9-10 (stating that removing incentives provided by exchange rebate tiers would drive liquidity off exchange and negatively impact exchange liquidity provision). See also Data Boiler Letter I at 28-29 (stating that determinable requirement will lead to increased costs that will be passed along to customers as higher commissions or reduced services and could lead to higher barriers to entry because the requirement may cause a "direct hit to broker-dealers' bottom line" which will force them to "find alternative ways to squeeze, exploit, or rent seek to cover their losses" and urging adoption of "Copyright Licensing mechanism" instead.).

708 Virtu Letter II at 9-10 (stating the "effort required to understand the volume fee system, forecast volume fees for an upcoming period, and confirm that fees are indeed being calculated appropriately will especially disadvantage smaller brokers, who typically have less resources . . . for needless work such as this.").

709 Virtu Letter II at 9.

710 Cboe Letter III at 2.

711 Cboe Letter III at 6-7.

712 Virtu Letter III at 9-10.

The new rule does not prohibit exchange liquidity provision incentives nor add complexity as suggested by some commenters. It instead shifts the time of calculating fees or rebates so that investors and other market participants are informed, when placing an order, of the amount of the fee or rebate that will be assessed. Rule 610(d) does not alter an exchange's ability to offer incentive programs based on volume tiers or any another metric; rather it will provide prospective certainty regarding what fee/rebate the market participant will incur/earn by achieving the requisite benchmark. Therefore, exceptions for liquidity provision incentives are not appropriate or necessary. Further, Rule 610(d) does not require exchange fees, rebates or other remuneration to be based on activity from a specific measurement period provided the metric used can be achieved prior to the time of execution, nor does it impose any obligations or additional costs on market participants to perform any new calculations, make new projections or forecasts, or undertake any new responsibilities. The Commission is not requiring market participants to undertake any obligations regarding the calculation of the applicable fee/rebate. Instead, Rule 610(d) will facilitate a market participant's ability to know the amount of the fee/rebate based on historical (rather than future) volume, so that it can understand how a volume-based fee/rebate will apply at the time of execution.[713] Rule 610(d) will allow market participants to calculate the amount of the fee/rebate using data available at the time of execution rather than have to forecast or estimate the cost of their transaction. As discussed below, this

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713 Implicit in the use of historical rather than future volume is that market participants will know the amount of the fee/rebate that will apply at the time of the execution. As discussed above, exchange fees are subject to the requirements of the Exchange Act and the rules thereunder, which require, among other things, that every exchange post and maintain a current and complete version of the entirety of each and every fee, due, and charge assessed by an exchange, Because information necessary to calculate the amount of the fee or rebate will be knowable at the time of execution, Rule 610(d) will provide market participants with the ability to determine the fee or rebate due at the time of execution.

certainty and transparency regarding the fee and rebate that will apply to a particular transaction will benefit market participants and improve market quality.[714]

Further, one commenter requested the Commission withdraw proposed Rule 610(d) in light of its subsequent proposed rule addressing volume-based transaction pricing because the proposals are "inextricably linked" and "so contradictory and indeterminate that the public has not had a reasonable opportunity to comment on what the Commission is actually proposing."[715]

The Commission disagrees. The Fee Tiers Proposal remains a proposal. As explained throughout this section, the increased certainty and transparency Rule 610(d) will require will provide benefits to investors and other market participants on its own. Further, the two proposals are not contradictory because Rule 610(d) applies to all exchange fees and rebates not just those that are volume-based, whereas the Fee Tiers Proposal specifically concerns volume-based pricing and agency-related orders as well as a disclosure requirement that would be fully compatible with Rule 610(d). Accordingly, both proposals are compatible in their different scopes, objectives, and application and so are not in conflict. In addition, Rule 610(d) is not indeterminate but rather straightforward; the public has had the opportunity to comment and many have, in fact, so commented.

Another commenter stated the Commission should revise proposed Rule 610(d) to require fees and rebates to be known "*before* the time of execution" and require "all affected trading venues to publish their fees in machine-readable format" to allow market participants to

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714 See infra section VII.D.3.

715 Citadel Letter II at 6 (stating that comments on Rule 610(d) were provided "on the basis that volume-based fee tiers *were explicitly not being prohibited"* and requesting the Commission "propose and publish an analysis assessing the cumulative effect of the two proposals that allows commenters to consider the broader implications (and the Commission's analysis of those implications) of prohibiting volume-based transaction pricing for certain orders.").

more readily consume a trading venue's fee schedule and update participant systems.[716] Implicit in the requirement that fees/rebates be determinable at the time of execution is use of historical, rather than future, volume to benchmark any qualifying criteria for a particular fee/rebate and thus the fee/rebate would be calculatable or determinable before the time of execution. For a fee to be determinable at the time of execution, it must be ascertainable before or contemporaneously with the execution. Otherwise, the purpose of Rule 610(d) – to provide certainty and transparency regarding what fee/rebate will apply at the time of execution – would be undermined. No change or clarification of Rule 610(d) is necessary because implicit in the requirement that fees/rebates be determinable at the time of execution is the ability to calculate the fee/rebate prior to execution.

Finally, new Rule 610(d) enhances transparency regarding exchange fees and rebates but does not require a specific format for publication of the information. Exchange fees are required to be posted on exchange websites[717] and, as is true today, if market participants need a specific format, they can make such requests to the exchanges.

V. Final Rule - Transparency of Better Priced Orders

The Commission, among other things, adopted new definitions of round lot[718] and odd-lot information[719] under the MDI Rules to enhance the transparency for investors and other market participants of quotes and orders in NMS stocks that have better prices than what has

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716 FIA PTG Letter II at 4. See also Citadel Letter I at 25; Healthy Markets Letter I at 26.

717 See rule 19b-4(m)(1). 17 CFR 240.19b-4(m)(1).

718 The MDI Rules adopted the definition of round lot in rule 600(b)(82). This provision was subsequently renumbered to Rule 600(b)(93) by the Rule 605 Amendments. 17 CFR 242.600(b)(93); Rule 605 Amendments, supra note 10.

719 The MDI Rules adopted the definition of odd-lot information in rule 600(b)(59). This provision was subsequently renumbered to Rule 600(b)(69) by the Rule 605 Amendments. 17 CFR 242.600(b)(69); Rule 605 Amendments, supra note 10.

been provided in SIP data.[720] In the Proposing Release, the Commission proposed: (1) to accelerate the implementation of these two definitions adopted under the MDI Rules, (2) an amendment to the definition of "regulatory data" in Rule 600(b)(78)(iv),[721] (3) to require each exclusive SIP to represent quotation sizes in consolidated information in terms of the number of shares, rounded down to the nearest multiple of a round lot, and (4) to amend the definition of odd-lot information to include a best odd-lot order. As discussed in detail below, the Commission is: (1) adopting an accelerated implementation schedule for the round lot and odd-lot information definitions, with modifications to the proposed implementation schedule; (2) adopting the amendment to the definition of "regulatory data", as proposed;[722] (3) requiring each exclusive SIP to represent quotation sizes in consolidated information in terms of the number of shares, rounded down to the nearest multiple of a round lot, as proposed; and (4) modifying the Commission's approach in the Proposing Release by adopting amendments to the round lot definition that will require less frequent round lot adjustments—i.e., semiannually, rather than monthly—by defining a round lot "Evaluation Period" and by specifying an operative period.[723] In addition, the Commission is adopting the best odd-lot order data element, as proposed.

A. Background

The MDI Rules expanded NMS information and established a decentralized consolidation model, pursuant to which competing consolidators will eventually replace the

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720 See MDI Adopting Release, supra note 10.

721 See supra note 320.

722 The Commission is adopting this amendment to the definition of regulatory data in Rule 600(b)(89)(iv). See supra note 320.

723 The Commission is not changing the calculation used to assign round lots or the round lot tiers in the round lot definition adopted in the MDI Rules.

exclusive SIPs for the collection, consolidation, and dissemination of NMS information.[724] The Commission adopted a phased transition plan for the MDI Rules,[725] which has been delayed.[726] Accordingly, NMS information is currently collected, consolidated and disseminated within the national market system by the exclusive SIPs as SIP data.[727]

Because the MDI Rules are not yet implemented, NMS stock quotation information that is included in SIP data is provided in round lots, as defined in exchange rules,[728] and for most NMS stocks a round lot is defined as 100 shares.[729] Under Rule 600(b)(93), as adopted by the MDI Rules,[730] round lot sizes are assigned to each NMS stock based on its average closing price and those NMS stocks that have an average closing price in the prior month greater than $250.00 will be assigned a round lot in a size that is less than 100 shares.

Moreover, because the MDI Rules are not yet implemented, information about orders in NMS stocks that have a size less than a round lot, i.e., odd-lot orders, is available on individual exchange proprietary data feeds, and market participants interested in quotation information for individual odd-lot orders must purchase these proprietary feeds.[731] SIP data includes odd-lot transaction information but does not include odd-lot quotation information, except to the extent that odd-lot orders are aggregated into round lots pursuant to exchange rules.[732]

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724 See MDI Adopting Release, supra note 10.

725 See Proposing Release, supra note 11, at 80295 (describing the phased transition plan for the MDI Rules).

726 See supra notes 74-78 and accompanying text.

727 See supra notes 63-65 and accompanying text for a description of SIP data.

728 See supra note 66.

729 See supra note 67.

730 See supra note 718.

731 See supra notes 67-68 and accompanying text.

732 See MDI Adopting Release, supra note 10, at 18727.

The MDI Rules were designed to increase transparency into, among other things, the best priced quotations available in the market.[733] Under the MDI Rules' phased transition plan, the round lot and odd-lot information definitions were scheduled to be implemented during later phases in order to avoid imposing costs on the exclusive SIPs, which will be retired upon full implementation of the MDI Rules.[734] Due to the delays in the MDI Rules' implementation, as discussed in the Proposing Release,[735] the Commission is adopting an accelerated implementation schedule, with some modifications from the proposal, so that market participants, including investors, will be provided with the enhanced transparency benefits earlier than anticipated in the MDI Rules.

B. Final Rule - Round Lots

The Commission is amending the implementation schedule for the round lot definition that was adopted in the MDI Rules. The round lot definition will be implemented on the first business day of November 2025. This adopted compliance date is modified from the proposal, which required compliance with the round lot definition 90 days from Federal Register publication of any Commission adoption of an earlier implementation of the round lot definition.[736] The Commission has provided more time than what was proposed so that market participants can update and modify their systems.[737] However, the adopted compliance date still

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733 MDI Adopting Release, supra note 10, at 18601-02, 18617; see also 17 CFR 242.600(b)(93).

734 See MDI Adopting Release, supra note 10, at 18700-01; see also Proposing Release, supra note 11, at 80295, 80298-99.

735 See Proposing Release, supra note 11, at 80295.

736 See Proposing Release, supra note 11, at 80300-01.

737 See infra section VI.C.

accelerates the time by which the definition will be implemented as compared to the preexisting schedule adopted in the MDI Rules.[738]

In addition, the Commission is amending the round lot definition to include a new definition for an "Evaluation Period" and a provision specifying the operative dates for round lot assignments. These amendments will align the dates for assigning round lots to the dates for assigning minimum pricing increments under Rule 612.[739]

Finally, the Commission is also adopting, as proposed, the amendment to the "regulatory data" definition in Rule 600(b)(89)(iv).[740]

1. Round Lot Definition

Rule 600(b)(93), as adopted by the MDI Rules,[741] defines a round lot for NMS stocks that have an average closing price on the primary listing exchange during the prior calendar month of: (1) $250.00 or less per share as 100 shares; (2) $250.01 to $1,000.00 per share as 40 shares; (3) $1,000.01 to $10,000.00 per share as 10 shares; and (4) $10,000.01 or more per share as 1 share.[742] For any new NMS stock for which the prior calendar month's average closing price is not available, a round lot is 100 shares. As a result of the MDI Rules' round lot definition, each exchange's BBO and the NBBO for an NMS stock could be based upon smaller, potentially

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738 See Proposing Release, supra note 11, at 80295; see also supra notes 74-78 and accompanying text.

739 See supra section III.C.8.

740 See supra note 320.

741 See supra note 718.

742 17 CFR 242.600(b)(93). The definition of regulatory data adopted in the MDI Rules also requires that a round lot indicator be included in NMS information so that market participants will know the size of a round lot for each NMS stock. The primary listing exchange must provide, among other things, an "indicator of the applicable round lot size" to competing consolidators and self-aggregators. 17 CFR 242.600(b)(89); MDI Adopting Release, supra note 10, at 18634. In addition, the MDI Rules require competing consolidators to represent quotation sizes for certain core data elements in terms of the number of shares, rounded down to the nearest multiple of a round lot. 17 CFR 242.600(b)(26)(iii); MDI Adopting Release, supra note 10, at 18615.

better priced orders,[743] which would improve transparency regarding the better priced quotations available in the market and the ability of market participants to access these quotations.[744]

In the MDI Adopting Release, the Commission analyzed data from May 2020 on the portion of all corporate stock and ETF volume executed on an exchange, transacted in a quantity less than 100 shares, at a price better than the prevailing NBBO, occurring in a quantity that would be defined as a round lot under the MDI Rules.[745] The Proposing Release repeated this analysis using data for the dates March 25-31, 2022.[746] Both analyses demonstrated that the round lot definition adopted in the MDI Rules will capture significant percentages of better priced odd-lot orders for NMS stocks with an average closing price greater than $250.00.

The Commission has updated this analysis from the Proposing Release with data from October 2023. As discussed below, upon further consideration and evaluation of comments, the Commission is adopting modifications to the round lot definition to require less frequent round

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743 Orders currently defined as odd-lots often reflect superior pricing. See MDI Adopting Release, supra note 10, at 18616 n.241 (describing analysis of data from May 2020 that found that "approximately 45% of all trades executed on exchange and approximately 10% of all volume executed on exchange in corporate stocks and ETFs occurred in odd-lot sizes (i.e., less than 100 shares), and 40% of those odd-lot transactions (representing approximately 35% of all odd-lot volume) occurred at a price better than the NBBO"). More recent data and updated analyses confirm that these pricing patterns in odd-lot trading have continued. See Proposing Release, supra note 11, at 80296.

744 See MDI Adopting Release, supra note 10, at 18601, 18615, 18742, 18744-45. In the MDI Proposing Release, the Commission explained the importance of increasing transparency into odd-lot quotation information by demonstrating that odd-lot transactions make up a significant proportion of transaction volume in NMS stocks (including ETPs), through provision of the daily exchange odd-lot rate (i.e., the number of exchange odd-lot trades as a proportion of the number of exchange trades) for corporate stocks and ETPs in 2018 and in June 2019. See Securities Exchange Act Release No. 88216 (Feb. 14, 2020), 85 FR 16726, 16739 (Mar. 24, 2020) ("MDI Proposing Release"). For this release, Commission staff repeated this analysis to determine the daily exchange odd-lot rate for 2023. Based on data from the Commission's MIDAS analytics tool, the daily exchange odd-lot rate for all corporate stocks ranged from approximately 61% to 70% of trades and the daily exchange odd-lot rate for all ETPs ranged from 31% to 42% of trades in 2023. Accordingly, accelerating the implementation of the round lot and odd-lot information definitions will increase the pre-trade transparency of better priced orders that are prevalent in the national market system.

745 See MDI Adopting Release, supra note 10, at 18612 (Table 1).

746 See Proposing Release, supra note 11, at 80296-97 (Tables 1 and 2).

lot adjustments so that they occur on a semiannual basis, rather than on a monthly basis and the calculation of the average closing price on the primary listing exchange will be based on a one-month "Evaluation Period."[747] The updated analysis accounts for the modifications to the round lot definition and is based on data from October 23-27, 2023, using a March 2023 Evaluation Period to be consistent with the adopted rule.[748] The updated analysis demonstrates that the round lot definition, as amended, will capture significant percentages of better priced odd-lot orders.

Tables 1 and 2 examine the portion of all corporate stock and ETP share volume and trades executed on an exchange, transacted in a quantity less than 100 shares, at a price better than the prevailing NBBO, occurring in a quantity defined as a round lot under the MDI Rules, as amended by the Commission.

Table 1

Round Lot Tier	Round Lot Size	Portion of all corporate stock and ETP share volume executed on an exchange, transacted in a quantity less than 100 shares, at a price better than the prevailing NBBO, occurring in a quantity that would be defined as a round lot under the MDI Rules as amended, for Oct. 23-27, 2023
$0-$250.00	100 Shares	0.00%
$250.01-$1,000.00	40 Shares	52.89%
$1,000.01-$10,000.00	10 Shares	76.89%
$10,000.01 or more	1 share	100.00%

747 See infra section V.B.3.b.iv. Amended Rule 600(b)(93)(iii) defines the Evaluation Period as (A) all trading days in Mar. for the round lot assigned on the first business day in May and (B) all trading days in Sept. for the round lot assigned on the first business day of Nov. during which the average closing price of an NMS stock on the primary listing exchange shall be measured by the primary listing exchange to determine the round lot for each NMS stock.

748 See infra section V.B.3.b.iv. The analysis used the average closing price of the NMS stocks on their primary listing exchange for all trading days in Mar. 2023 and used those average prices to determine the size of the round lot for each stock in the universe. Those round lots were then applied to the analysis of the stocks' trading data for Oct. 23-27, 2023.

Source: Equity consolidated data feeds (CTS and UTDF), as collected by MIDAS; NYSE Daily TAQ.

Table 2

Round Lot Tier	Round Lot Size	Portion of all corporate stock and ETP trades executed on an exchange, transacted in a quantity less than 100 shares, at a price better than the prevailing NBBO, occurring in a quantity that would be defined as a round lot under the MDI Rules as amended, for Oct. 23-27, 2023
$0-$250.00	100 Shares	0.00%
$250.01-$1,000.00	40 Shares	13.79%
$1,000.01-$10,000.00	10 Shares	26.63%
$10,000.01 or more	1 share	100.00%

Source: Equity consolidated data feeds (CTS and UTDF), as collected by MIDAS; NYSE Daily TAQ.

The Proposing Release also included the results of a simulation conducted by the Commission, using exchange direct feed data from MIDAS for every trading day in March 2022, to create a mockup competing consolidator feed that included quotation information for a sample of NMS stocks priced at or over $250.01 using the priced-based round lot sizes adopted in the MDI Rules' round lot definition as opposed to the round lot sizes that are defined in current exchange rules (typically 100 shares).[749] Snapshots of this simulated feed were compared against snapshots of the exclusive SIP feed for the sample of NMS stocks at the same point in time. For two of the three round lot price tiers above $250.01, the simulated competing consolidator feed showed better prices, on average, than the exclusive SIP feed.[750]

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749 See supra note 66.

750 See Proposing Release, supra note 11, at 80297 (stating, "[f]or stocks priced between $250.01 and $1,000.00 per share, which will have a round lot size of 40 under the round lot definition, the price

The Commission has updated this analysis using exchange direct feed data from MIDAS for every trading day in November 2023 and to account for the modifications to the round lot definition.[751] Like the prior analysis, the Commission conducted a simulation of a competing consolidator feed that provides quotation information for a sample of NMS stocks priced at or over $250.01 using the priced-based round lot sizes adopted in the MDI Rules' round lot definition as opposed to the round lot sizes that are defined in current exchange rules (typically 100 shares).[752] Snapshots of this simulated feed were compared against snapshots of the exclusive SIP feed for that NMS stock at the same point in time. For two of the three price tiers and corresponding round lot sizes, the simulated feed showed better prices, on average, than the exclusive SIP feed.[753] For stocks priced between $250.01 and $1,000.00 per share, which will have a round lot size of 40 under the round lot definition, the price reflected in the simulated competing consolidator feed was better than the exclusive SIP feed 31.93% of the time and worse less than .1% of the time. For stocks priced between $1,000.01 and $10,000.00 per share, which will have a round lot size of 10 under the round lot definition, the price reflected in the

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reflected in the simulated competing consolidator feed was better than the exclusive SIP feed 21.47% of the time and worse less than .1% of the time. For stocks priced between $1,000.01 and $10,000.00 per share, which will have a round lot size of 10 under the round lot definition, the price reflected in the simulated competing consolidator feed was better than the exclusive SIP feed 64.67% of the time and worse less than .1% of the time."). For the third round lot price tier above $250.01, for stocks priced $10,000.01 or more, the Proposing Release stated that there was one stock that was priced over $10,000 per share and was already quoted in one-share round lots on the exclusive SIP feed; therefore, the simulated feed and exclusive SIP feed showed the same prices for the stock. Id. at 80297 n.369.

751 The Commission assigned a sample of NMS stocks to a round lot tier based upon their average closing prices on the primary listing exchange during Sept. 2023 to account for the adopted definition of Evaluation Period under the round lot definition, which states that the Evaluation Period for the round lot assigned on the first business day of Nov. would be all trading days in Sept. See amended Rule 600(b)(93)(iii).

752 See supra note 66.

753 In the third price tier, which defines a round lot for stocks priced $10,000.01 or more per share as an order for the purchase or sale of an NMS stock of one share, only one stock, which is already quoted in one share round lot on the exclusive SIP feed, was priced over $10,000 per share, so the simulated feed and exclusive SIP feed showed the same prices for this stock.

simulated competing consolidator feed was better than the exclusive SIP feed 80.77% of the time and worse less than .2% of the time. The updated analysis continues to demonstrate that the simulated competing consolidator feed, which reflects the round lot sizes adopted in the MDI Rules' round lot definition, provides better prices than the exclusive SIP feeds, which reflect the prior round lot size, in NMS stocks priced over $250.01, even with the modifications to the round lot definition.[754]

2. Proposed Acceleration of Round Lot Definition

The Commission proposed to accelerate the implementation of the round lot definition set forth in Rule 600(b)(93).[755] Specifically, the Commission proposed to require compliance with the round lot definition 90 days from Federal Register publication of any Commission adoption of an earlier implementation of the round lot definition.[756]

In the MDI Adopting Release, the Commission stated that "sequencing [round lot implementation] after the parallel operation period is important to avoid either: (1) potential confusion and market disruption that could result from two different round lot structures operating at the same time; or (2) imposing reprogramming costs on the exclusive SIPs for a limited time period prior to their retirement."[757] However, because full implementation of the

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754 See supra note 750.

755 See supra note 718.

756 See Proposing Release, supra note 11, at 80300.

757 MDI Adopting Release, supra note 10, at 18701. The Commission stated that "the consolidated market data products offered by competing consolidators during the initial parallel operation period would be based on the current definition of round lot." Id. at 18700. However, because the Commission is accelerating the implementation of the round lot definition, the exclusive SIPs will be providing SIP data that reflects the new round lot sizes during the initial parallel operation period. Further, the acceleration of the implementation of the round lot definition will result in its use during the parallel operation period by both the exclusive SIPs and competing consolidators. See supra note 73 for a discussion of the parallel operation period; infra section VI.C for a discussion of the modified compliance deadline.

MDI Rules as adopted pursuant to the phased transition plan[758] likely will not occur until at least two years after new proposals to amend the effective national market system plan(s) are developed, filed and approved by the Commission,[759] the Commission proposed to amend the phased transition schedule of the MDI Rules to allow the benefits of the round lot definition to be made available to investors sooner.[760] The benefits identified in the MDI Adopting Release justify the costs of accelerating the implementation of the round lot definition in this rulemaking.[761]

Further, as part of accelerating the implementation of the round lot definition, the Commission proposed to amend the definition of "regulatory data" in Rule 600(b)(78) to require the indicator of the applicable round lot size to be provided to the exclusive SIPs for collection and dissemination.[762] The preexisting definition of "regulatory data" required the primary listing exchange for an NMS stock to provide to competing consolidators and self-aggregators an indicator of applicable round lot size.[763] The Commission proposed to add new paragraph (iv) to the definition of "regulatory data" to require the primary listing exchanges to also make the indicator available to the exclusive SIPs.[764] Referencing the round lot indicator adopted with regard to competing consolidators in the MDI Rules, the Commission stated that such an

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758 See supra notes 73-78 and accompanying text.

759 See Proposing Release, supra note 11, at 80295. See also MDI Adopting Release, supra note 10, at 18699-701. The two-year estimated timeframe includes the implementation of the round lot definition, which was scheduled to occur at the end of the transition plan.

760 See Proposing Release, supra note 11, at 80300-01.

761 See infra section VII.D.5.

762 Under the MDI Rules, the definition of regulatory data requires the primary listing exchange to make an indicator of the applicable round lot size to competing consolidators and self-aggregators. See Rule 600(b)(89)(i)(E), 17 CFR 242.600(b)(89)(i)(E). See also supra note 320.

763 17 CFR 242.600(b)(89)(i)(E).

764 See Proposing Release, supra note 11, at 80299.

indicator will "help market participants ascertain the applicable round lot size for each NMS stock on an ongoing basis"[765] and "reduce confusion as market participants adjust to the new round lot sizes."[766] For these same reasons, the Commission proposed to require this indicator to be provided to the exclusive SIPs for collection and dissemination.[767]

3. Comments and Response

a. Comments Supporting the Proposed Change

The Commission received comments in support of the proposed acceleration of the implementation of the round lot definition from individuals,[768] firms,[769] exchanges,[770] and associations.[771] Several commenters supported the proposed acceleration of the implementation of the round lot definition because they said that it would improve transparency[772] and enhance

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765 See Proposing Release, supra note 11, at 80299. For more details, see MDI Proposing Release, supra note 744, at 16762.

766 See Proposing Release, supra note 11, at 80299; MDI Adopting Release, supra note 10, at 18619.

767 See Proposing Release, supra note 11, at 80299. As discussed below, since the MDI Rules already require the primary listing exchanges to provide an indicator of the applicable round lot size to competing consolidators and self-aggregators, the incremental cost of providing this indicator to the two exclusive SIPs should be low. See infra section VIII.G.

768 See Comment Letters Type E, F, G, H, I, J, K, available at https://www.sec.gov/comments/s7-30-22/s73022.htm; see, e.g., Letters from Aron Tastensen (Feb. 23, 2023); Aswin Joy (Mar. 7, 2023); Abraham (Mar. 14, 2023); Andrew A. (Mar. 19, 2023).

769 See, e.g., XTX Letter at 5; BMO Letter at 2; Schwab Letter II at 36; Citigroup Letter at 3; Hudson River Letter at 2; Fidelity Letter at 9, 16; BlackRock Letter at 11-12; Vanguard Letter at 2.

770 See, e.g., NYSE Letter I at 7; Nasdaq Letter I at 3; MEMX Letter at 2, 4, 5-6; Cboe Letter II at 2, 10; IEX Letter I at 6, 30; Cboe Letter III at 10 and n.18. The Commission also received comment letters submitted by both exchanges and firms that supported the accelerated implementation of the round lot definition. See Cboe, State Street, et al. Letter at 2; NYSE, Schwab, and Citadel Letter at 2.

771 See, e.g., MFA Letter at 3, 13-14; Better Markets Letter I at 16-17; SIFMA AMG Letter I at 9; CCMR Letter at 22; FIA PTG Letter II at 4-5; ICI Letter I at 6-7; SIFMA Letter II at 34, 44; STA Letter at 8. See also AIMA Letter at 3 (stating that the Commission should prioritize the implementation of the round lot definition and the Rule 605 Proposal).

772 See Comment Letter Type E, I, available at https://www.sec.gov/comments/s7-30-22/s73022.htm; see, e.g., Letters from Bill Gilbert (Mar. 7, 2023); Richard Pasquali (Mar. 16, 2023); IEX Letter I at 6; MFA Letter at 13-14; XTX Letter at 5; Better Markets Letter I at 16-17; BlackRock Letter at 11-12 (stating that accelerated implementation of the round lot and the odd-lot information definitions would increase pre-trade transparency for investors); FIA PTG Letter II at 4; Hudson River Letter at 2; ICI Letter I at 6.

price discovery.[773] Several commenters stated that the proposed change would result in more accurate prices,[774] allow investors to make more informed trading decisions,[775] improve execution quality,[776] and reduce transaction costs and inefficiencies.[777]

One commenter supported the proposed acceleration of the implementation of the round lot definition because the commenter said it would narrow the NBBO spread by incorporating current odd-lot interest and "mak[ing] the notional size associated with the NBBO more uniform across stock price levels."[778] Another commenter supported the proposal because the round lot definition "would enhance the accuracy of the NBBO for high-priced stocks."[779] Some commenters supported the proposed acceleration of the implementation of the round lot definition because they stated that this change would restore public trust,[780] or because this change and the dissemination of odd-lot information by the exclusive SIPs would enhance reporting efficiency and reduce delays.[781] Commenters also supported the proposed acceleration

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773 See, e.g., XTX Letter at 5 (also referring to the proposed publication on the exclusive SIPs of odd-lots priced better than the NBBO); Cboe Letter II at 10, Cboe Letter I at 10 (stating that the proposed acceleration of the round lot definition and the display of odd-lot orders would improve price discovery and reduce spreads); ICI Letter I at 6.

774 See, e.g., IEX Letter I at 6 (referring to the proposed acceleration of the implementation of the round lot definition as well as the display of odd-lot orders).

775 See, e.g., MFA Letter at 13-14; Better Markets Letter I at 16-17; FIA PTG Letter II at 4.

776 See, e.g., MFA Letter at 13-14; Better Markets Letter I at 16-17; BlackRock Letter at 11 (stating that accelerated implementation of the round lot and the odd-lot information definitions would result in enhanced execution quality for investors).

777 See FIA PTG Letter II at 4.

778 See Hudson River Letter at 2.

779 See CCMR Letter at 22.

780 See, e.g., Letters Type E, G, J, available at https://www.sec.gov/comments/s7-30-22/s73022.htm; see also e.g., Letters from Christopher Nieto (Mar. 31, 2023); Michael Montalban (Mar. 31, 2023).

781 See, e.g., Letter Type K, available at https://www.sec.gov/comments/s7-30-22/s73022.htm.

of the implementation of the round lot definition because they stated that the round lot definition would result in lot sizes that would better suit the needs of investors.[782]

In the MDI Adopting Release, as well as the Proposing Release, the Commission described the benefits of the adopted round lot definition.[783] The Commission stated that the new round lot definition will "narrow NBBO spreads for most stocks with prices greater than $250,"[784] improve transparency and "the comprehensiveness of and usability of core data, facilitate the best execution of customer orders, and reduce information asymmetries."[785] The Commission also stated that the reduced round lot size for high priced NMS stocks would "better ensure the display and accessibility of significant liquidity for high-priced stocks."[786] Some commenters supported the proposed acceleration of the implementation of the round lot definition but stated that more time than proposed was needed for compliance.[787] As discussed later in this release, the Commission is providing more time to implement the round lot definition than the 90-days that was proposed for implementation.[788]

One commenter supported the proposed acceleration of the implementation of the round lot definition subject to "regulatory and industry-wide education to investors on the changes."[789]

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782 See, e.g., IEX Letter I at 30; BlackRock Letter at 11 (stating that the proposed acceleration of the implementation of both the round lot and odd-lot definitions would increase the usefulness of the exclusive SIPs because of the prevalence of current odd-lot sizes); MEMX Letter at 4; STA Letter at 8.

783 See Proposing Release, supra note 11, at 80296.

784 Id.

785 Id.

786 Id.

787 See, e.g., NYSE Letter I at 7; Nasdaq Letter I at 3; Fidelity Letter at 16; Cboe Letter III at 10 n.18.

788 See infra section VI.C.

789 See Fidelity Letter at 16.

As with many regulatory changes, investor education and notification may be useful so that investors better understand the implications of the size of their orders.

b. Comments Objecting to the Proposed Change

The Commission also received comments that raised objections to specific aspects of the proposed acceleration of the implementation of the round lot definition. These comments are addressed below.

i. Comments on the Interaction between the Round Lot Definition and the Proposed Minimum Pricing Increments

The Commission received comments that expressed concern about the potential impact of both the implementation of the round lot definition and the proposed changes to the minimum pricing increments.[790] Specifically, some commenters raised concerns about the potential impact of both proposed changes on liquidity and NBBO depth.[791] One commenter stated that smaller round lot sizes would make the NBBO "less robust, as a smaller amount of liquidity would now establish the NBBO benchmark," compounded by the proposed reduction in quoting tick sizes that would require liquidity to be dispersed in finer pricing increments.[792] One commenter stated that the proposed minimum pricing increments and "the round lot reforms" would be duplicative because they would both result in narrow spreads.[793] In addition, one commenter stated that the round lot definition and proposed minimum pricing increments "would significantly reduce

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790 See, e.g., Virtu Letter II at 10; Citadel Letter I at 26; ASA Letter at 6; Tastytrade Letter at 22; SIFMA Letter II at 34; Morgan Stanley Letter at 3. See also Nasdaq Letter I at 34 (stating that "an effective tick reform proposal may alleviate the need to speed implementation of the round and odd lot proposals.").

791 See, e.g., Virtu Letter II at 10; Citadel Letter I at 26.

792 See Virtu Letter II at 10.

793 See ASA Letter at 6.

transparency on the SIP and force more participants to purchase costly direct feeds to maintain the same level of transparency of liquidity."[794]

Although the Commission agrees that both the round lot definition adopted in the MDI Adopting Release and the amended minimum pricing increments will impact the NBBO and will result in a narrower spread for impacted NMS stocks, the NMS stocks that would be subject to both the round lot definition and the amended minimum pricing increments are likely to be very small in number and also extremely liquid, which could counteract any potential harm to liquidity resulting from the interaction of both changes. The round lot definition adopted in the MDI Adopting Release and the amended minimum pricing increments each will impact the NBBO and each will result in a narrower spread for those NMS stocks that are assigned a smaller round lot[795] or a smaller minimum pricing increment.[796]

The round lot definition will narrow the spread for NMS stocks that have an average closing price over $250 per share by showing better prices for these stocks. The amended minimum pricing increments will reduce the spread for those NMS stocks that have a narrow TWAQS and will allow these stocks to be priced more competitively in smaller increments, which will more accurately reflect supply and demand. Accordingly, the smaller round lot and the smaller minimum pricing increment narrow spreads in different ways. In response to the comment stating that the round lot definition and the proposed tick size changes are duplicative

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794 See Virtu Letter II at 10.

795 See infra section VII.D.4.a.

796 See infra section VII.B.2; section VII.D.1.

because they would both result in narrow spreads,[797] both requirements will narrow spreads, but they are not duplicative.

Although there may be NMS stocks that are assigned both a smaller round lot and a smaller minimum pricing increment, Commission analysis of data discussed below shows that this overlapping universe of NMS stocks is very small. In other words, most NMS stocks will not be assigned both a round lot that is less than 100 shares and a smaller $0.005 minimum pricing increment and therefore will not experience a combined impact on the NBBO spread or depth. As explained in the analysis, since only a few NMS stocks are expected to be subject to both a smaller round lot and a smaller tick size, the potential combined impact of the amendments to the minimum pricing increments and round lots should be limited.[798] Specifically, in response to comments expressing concerns about the combined impact of the proposed smaller minimum pricing increments and the implementation of the round lot definition,[799] the Commission conducted the analysis to determine the magnitude of NMS stocks that would be impacted by both changes. According to the Commission's analysis, as of November 30, 2023, only 163 NMS stocks were priced above $250.00 per share and would have been potentially eligible to be assigned to a round lot size smaller than 100 shares, out of a universe of 11,200 NMS stocks on that date.[800] Further, based on Commission review of the 163 NMS stocks that would have been assigned to a round lot less than 100 shares, as of November 30, 2023, only two out of the 163

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797 See ASA Letter at 6.

798 See infra section VII.D.4.a. (discussing the impact of the acceleration of the implementation of the round lot definition and reduced tick sizes and stating that the number of stocks trading over $250 with spreads narrower than $0.015 is "likely very small").

799 See, e.g., Virtu Letter II at 10; Citadel Letter I at 26; ASA Letter at 6.

800 The Proposing Release stated that, based on average closing prices on the primary listing exchange in Mar. 2022, there were 181 NMS stocks priced over $250. See Proposing Release, supra note 11, at 80300 n.407.

had an average quoted spread over the previous thirty trading days of $0.015 or less and therefore may have been potentially eligible to have been assigned to the smaller $0.005 minimum pricing increment.[801] The two NMS stocks—SPY and QQQ—are among the most liquid exchange-traded products.[802] For the month of November 2023, SPY had the highest average daily traded value, while QQQ was ranked second in average daily traded value.[803]

Based on this information, while the Commission recognizes that the interaction of the minimum pricing increment and the round lot definition may result in some reduction of depth for the very few NMS stocks that may be subject to both a smaller tick size and a round lot size of less than 100 shares,[804] the impact of the reduction of NBBO depth should not be of such a level as to impede trading in the affected NMS stocks because these stocks are highly liquid, which should greatly mitigate the impact of reduced depth at the NBBO.[805] Furthermore, these changes will benefit investors and other market participants trading these stocks through more accurate pricing and a reduction in spreads. While the extent of any reduced depth at the NBBO is not known at this time, due to the volume traded in these two NMS stocks, any potential

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801 These NMS stocks were ETFs: SPY and QQQ. As of Nov. 30, 2023, the last sale price for SPY was $454.30 and its average bid-ask spread over the previous 30 trading days was $0.0105. For QQQ, as of Nov. 30, 2023, the last sale price was $386.70 and the average bid-ask spread over the previous 30 trading days was $0.0116. This analysis was conducted using Bloomberg data. See also supra section III for a discussion of the amended minimum pricing increments. The calculation of a TWAQS for NMS stocks will occur during an Evaluation Period for purposes of assigning minimum pricing increments. See Rule 612(a)(1).

802 SPY and QQQ are also among the most liquid NMS stocks. Using Bloomberg data, for the period Jan. 22, 2024 – Feb. 16, 2024, SPY had the highest average daily traded value of all NMS stocks, while QQQ was ranked fourth. Specifically, for this period, the average daily traded value per day for SPY was $36,581,363,712, or 5.9% of total value traded of all U.S. equity trading, and for QQQ the average daily traded value per day was $18,632,960,000, or 3.5% of total value traded of all U.S. equity trading.

803 Based on daily average traded value for Nov. 1, 2023 – Nov. 30, 2023, using Bloomberg data. For SPY, the daily average traded value for Nov. 2023 was $31,652,396,337. For QQQ, it was $17,527,314,000.

804 See infra section VII.D.4.a.

805 See infra section VII.D.4.a. (stating, "[t]he exceptional liquidity of the affected stocks will likely protect their NBBO from material deterioration.").

reduction will not impair market participants' ability to trade these stocks because these stocks would be among the most liquid and therefore easily traded.[806]

Additionally, some liquidity that is consolidated at the preexisting round lot[807] and $0.01 minimum pricing increment may be reflected in the adopted round lot sizes and smaller minimum pricing increment. Specifically, some odd-lot orders are currently aggregated into the 100-share round lot.[808] Upon implementation of the round lot definition, some orders that were considered odd-lots may be of round lot size as defined. Further, interest that is displayed at the previously required $0.01 minimum pricing increment may be reflected in orders that are entered in the smaller tick size. Once these amendments are implemented, the NBBO will reflect better prices, both because of the smaller round lot size for some NMS stocks and new $0.005 increment for some other NMS stocks. As smaller sized orders in higher priced stocks are often priced better than orders that are currently in round lots, the smaller round lot sizes will allow potentially better priced orders to be the basis of the NBBO.[809] The new $0.005 increment will also result in the NBBO reflecting better prices because the smaller increment will allow orders to be priced in a manner that is more reflective of the supply and demand of liquidity for the stock.[810] Accordingly, each of these amendments will result in narrower NBBO spreads and better prices.[811] Further, those market participants that may need to trade in large sizes may be

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806 Id.

807 See supra note 66.

808 See MDI Proposing Release, supra note 744, at 16738-39 (describing exchange rules on aggregating odd-lot across multiple prices and providing them to the exclusive SIPs at the least aggressive price if the combined odd-lot interest is equal to or greater than a round lot).

809 See Proposing Release, supra note 11, at 80294; MDI Adopting Release, supra note 10, at 18616.

810 See infra section VII.D.1; section VII.D.1.b.i; section VII.D.1.b.ii; section VII.E.3.

811 See infra section VII.D.1 and note 1145 and accompanying text.

able to see liquidity outside of the NBBO by considering the new odd-lot information that will be available in SIP data as well as depth of book data that is available via exchange proprietary data feeds.[812]

In response to the comment that raised concerns about the potential for the proposed variable minimum pricing increments and the new round lots to reduce transparency on the exclusive SIPs,[813] for the reasons discussed above,[814] the combined impact of the adopted minimum pricing increments and round lot definition should not reduce transparency for most NMS stocks and the exclusive SIPs will provide a more accurate NBBO once these amendments are implemented. While the round lot will be smaller for certain NMS stocks, as described above, the NBBO based on the new round lots will in many cases reflect better prices.[815] Therefore, while the actual number of shares will be smaller for certain NMS stocks, the disseminated prices will likely be better.[816] In addition, as discussed above, the new minimum pricing increment required under Rule 612 for certain NMS stocks will allow the NBBO that is disseminated by the exclusive SIPs to reflect more competitive pricing. These amendments will

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812 Once implemented, the MDI Rules will add depth of book information to consolidated market data, and this information will provide information about depth outside of the NBBO for those market participants that would find this information useful. See infra section VII.D.4.a.; MDI Adopting Release, supra note 10, at 18728, 18730 (explaining that SIP data currently only includes top of book quotes). 17 CFR 242.600(b)(26)(I) (defining "core data" to include depth of book data) and 17 CFR 242.600(b)(24)(i) (defining "consolidated market data" to include core data).

813 See Virtu Letter II at 10.

814 See supra notes 807-812 and accompanying text.

815 See supra section V.B.1. (Table 1 and Table 2).

816 See MDI Adopting Release, supra note 10, at 18742, 18743.

enhance the NBBO that is calculated and disseminated by the exclusive SIPs by reflecting more competitive and better available prices.[817]

Commenters also expressed concern that the implementation of the round lot definition and the proposed changes to the minimum pricing increments would confuse investors.[818] One commenter warned that changes to round lots and tick sizes would confuse retail investors and reduce trust in the market.[819]

Because there are expected to be only a small number of NMS stocks that could be subject to both a change in a minimum pricing increment and a change to the round lot size, the risk of investor confusion is limited. Market participants may choose to educate investors about the new round lot and amended minimum pricing increments, as they sometimes choose to educate investors regarding other regulatory changes that impact how investors enter orders. Investors are already familiar with three round lot sizes[820] and two minimum pricing increments,[821] so the addition of only one round lot size and one minimum pricing increment is unlikely cause investor confusion.[822] The Commission is also adopting new indicators for dissemination on the exclusive SIPs of the assigned round lots and minimum pricing increments to alert market participants, including investors, of the relevant round lot and minimum pricing

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817 See supra section III.C. See also MDI Adopting Release, supra note 10, at 18744, 18745. See also infra section VII.D.4.a. (stating that the round lot definition would shrink the NBBO for stocks priced greater than $250, would increase transparency and would result in better order execution).

818 See, e.g., Tastytrade Letter at 22; SIFMA Letter II at 34; Morgan Stanley Letter at 3.

819 See, e.g., Tastytrade Letter at 22.

820 Under exchange rules, there are three different round lot sizes. See supra note 67. The MDI Rules' round lot definition adds one more round lot size, i.e., 40 shares. Consistent with its views stated here, the Commission previously considered potential investor confusion with the additional round lot size and did not believe it will be confusing to investors. See MDI Adopting Release, supra note 10, at 18618.

821 Preexisting Rule 612 included two minimum pricing increments based on the price of a quote or order - $0.01 and $0.0001.

822 See supra section III. See also infra notes 1589-1593 and accompanying text.

increment for each NMS stock. These indicators will also help to mitigate concerns about any potential for investor confusion.[823]

ii. Comments on the Round Lot Indicator

The Commission proposed to amend Rule 600(b)(78) to add a requirement to make the indicator of the applicable round lot size available to the exclusive SIPs in Rule 600(b)(78)(iv).[824] The Commission is adopting this requirement as proposed in Rule 600(b)(89)(iv).[825] The Commission did not receive comments specifically supporting or objecting to the proposed amendment. However, two commenters cited this requirement as support for their arguments that the proposed 90-day compliance deadline for the round lot and odd-lot information definitions would provide an insufficient amount of time.[826] As discussed below,[827] the Commission is providing more time for compliance with the round lot definition, which is a substantially longer period for compliance than the 90 days that was proposed.[828] The Commission is providing a longer compliance period than proposed after considering the information provided by commenters that requested more time to comply with the implementation of the round lot definition, including implementation of the round lot indicator.[829] The additional time will provide market participants with time to make the changes necessary to implement the round lot indicator.

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823 See infra note 1385; MDI Adopting Release, supra note 10, at 18619.

824 See Proposing Release, supra note 11, at 80299.

825 See supra note 320.

826 See NYSE Letter I at 7-8; Letter from Robert Books, Chair of the Operating Committee, Operating Committees of the CTA Plan, CQ Plan and UTP Plan, dated Mar. 28, 2023 ("CTA, CQ, UTP Plans Operating Committees Letter") at 3. See also infra section VI.C.

827 See infra section VI.C.

828 See Proposing Release, supra note 11, at 80300-01.

829 See supra note 826; infra section VI.C.

iii. Comments on the Round Lot Definition

The Commission received comments on the round lot definition that was adopted in the MDI Rules.[830] Commenters raised concerns about the defined round lot sizes,[831] the determination of round lot size based on price,[832] the impact of smaller round lot sizes on the relevance of the NBBO,[833] and the impact of the round lot definition as well as the odd-lot information definition on bandwidth.[834] The Commission considered and addressed issues related to adopting the round lot definition and the odd-lot information definition in the MDI Adopting Release.[835]

One commenter stated that investors trading in options may be confused by the round lot definition, stating that retail investors who trade options know one options contract represents 100 shares or a "round lot."[836] The Commission considered and addressed the interaction of the new round lot definition and options trading in the MDI Adopting Release.[837] Further, it is unlikely that the acceleration of the round lot definition could confuse retail investors trading in options. Specifically, the round lot size will not change the size of the options contract and precedent exists for standard options contracts on stocks with a round lot size less than 100

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830 See, e.g., RBC Letter at 5; Tastytrade Letter at 21; T. Rowe Price Letter at 4; Pragma Letter at 8-9; Data Boiler Letter I at 8 and Data Boiler Letter II at 2.

831 See, e.g., Pragma Letter at 1, 8, 9; T. Rowe Price Letter at 4.

832 See, e.g., Tastytrade Letter at 21.

833 See, e.g., RBC Letter at 5.

834 See Data Boiler Letter I at 8; see also Data Boiler Letter II at 2. The commenter raised concerns about the round lot and odd-lot information definitions.

835 See MDI Adopting Release, supra note 10, at 18615-22.

836 See Tastytrade Letter at 22.

837 See MDI Adopting Release, supra note 10, at 18619, 18747.

shares.[838] Furthermore, corporate actions, such as rights offerings, stock dividends, and mergers can result in adjusted contracts representing stock in amounts other than 100 shares, so investors have some familiarity already with options on underlying NMS stocks that have a "round lot" that is less than 100 shares.[839]

Several commenters also suggested eliminating the concept of round lots altogether.[840] The Commission is not eliminating the concept of round lots. As the Commission stated in the MDI Adopting Release, round lot orders continue to play an important role in the national market system by delineating orders of meaningful size and focusing regulatory requirements and protections—such as those set forth in rules 602, 604 and 611 of Regulation NMS—on such orders.[841] Further, as the Commission stated in the MDI Adopting Release, eliminating the concept of a round lot could also cause investor confusion and other unintended consequences.[842]

iv. Modified Round Lot Assignment Frequency and Evaluation Period for Round Lots

Under the MDI Rules, each NMS stock was assigned a round lot size every month based on its average closing price for the prior calendar month on its primary listing exchange.[843] Commenters raised concerns about potential confusion and operational risks arising due to the fact that round lots and the proposed minimum pricing increments would be changed at different

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838 For example, as of Oct. 26, 2023, one NMS stock has a round lot size of 10 shares while also possessing an option contract size of 100 shares.

839 See MDI Adopting Release, supra note 10, at 18619. See also infra section VII.D.4.a.

840 See, e.g., Nasdaq Letter I at 34-35; XTX Letter at 5; Angel Letter at 2-3; Anonymous Letter (Feb. 12, 2023) (stating that order sizes should be treated the same, regardless of status as a round lot or an odd-lot).

841 See MDI Adopting Release, supra note 10, at 18618 n.274.

842 See MDI Adopting Release, supra note 10, at 18618 n.274.

843 MDI Adopting Release, supra note 10, at 18617.

times,[844] and several commenters suggested aligning the assignment of round lots and minimum pricing increments, either on a quarterly or on a semiannual basis.[845] One commenter stated "having two to four adjustments per year strikes the appropriate balance between having the optimal round lot and minimum pricing increment with reducing the time that market participants are adjusting to the changes."[846] Another commenter warned that having differing assignment schedules for round lot sizes and minimum pricing increments "will materially elevate systemic risk since it only requires a single large market participant to create widespread disruption by failing to properly modify their systems."[847] The commenter suggested reducing the frequency of changes to quarterly or semiannually and synchronizing the round lot and minimum pricing increment changes.[848]

After further consideration, the Commission agrees with the concerns raised by the commenters. Frequent systems changes and updates can introduce risks for market participants and the market, and frequent changes to the terms of how an order is entered for an NMS stock can potentially cause investor confusion. Therefore, the Commission is amending the round lot

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844 See, e.g., FIF Letter at 13; Hudson River Letter at 2, 4; BlackRock Letter at 9, 10. See also SIFMA Letter II at 34, 35 (stating that "The Tick Size Proposal would make dynamic three components of trading that are static today: (i) tick sizes; (ii) access fees; and (iii) round lots. Exacerbating this complication, tick sizes would adjust quarterly, while round lots would change monthly. Tick sizes would be based on average quoted spread, while round lots are based on a stock's price."); Morgan Stanley Letter at 3 (stating that the proposed amendments would require "market participants to make frequent changes to their systems…" that "…the risk of technology failure created by monthly and/or quarterly changes to systems by the buy-side, sell-side, exchanges and vendors (including security information processors) may introduce new market and operational risks… " and that "…this dynamic aspect of the proposal could create investor confusion and potentially drive trading inefficiencies.").

845 Two commenters suggested aligning the assignment of round lots and minimum pricing increments on a quarterly or semiannual basis. See Hudson River Letter at 2, 4; BlackRock Letter at 10. One commenter suggested aligning both assignments on a quarterly basis. See FIF Letter at 13. See also infra notes 849-853 and accompanying text.

846 Hudson River Letter at 4.

847 BlackRock Letter at 10.

848 See id.

definition to make the timing for assigning round lots consistent with the timing for assigning minimum pricing increments. Such alignment on a semiannual basis will help to facilitate an orderly market and help reduce operational risks and investor confusion.

As described above, the Commission is adopting a definition of Evaluation Period under Rule 612 that will result in the assignment of minimum pricing increments on a semiannual basis instead of on a quarterly basis, as proposed.[849] The Commission has therefore decided to amend the round lot definition to change the frequency of round lot changes from a monthly basis to a semiannual basis (the round lot sizes and price tiers for assigning round lots adopted in the MDI Adopting Release have not changed). Specifically, the Commission is amending Rule 600(b)(93) to require round lots to be assigned on a semiannual basis instead of on a monthly basis, which will match the minimum pricing increment assignment frequency of amended Rule 612.[850] Amended Rule 600(b)(93)(i) will assign each NMS stock to a round lot size based on the NMS stock's average closing price on the primary listing exchange during a one month Evaluation Period. Amended Rule 600(b)(93)(iii) will define the Evaluation Period as (A) all trading days in March for the round lot assigned on the first business day in May and (B) all trading days in September for the round lot assigned on the first business day of November during which the average closing price of an NMS stock on the primary listing exchange shall be measured by the primary listing exchange to determine the round lot for each NMS stock.[851]

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849 While the Commission proposed in Rule 612(a) to define a quarterly tick evaluation period, it is adopting a semiannual tick Evaluation Period in amended Rule 612(a)(1). See supra section III.C.7.a.

850 The Commission's amendments to Rule 600(b)(93) will also renumber the sub-provisions within rule 600(b)(93). The round lot tiers in preexisting Rule 600(b)(93)(i)-(iv) will be renumbered as Rule 600(b)(93)(i)(A)-(D). Preexisting Rule 600(b)(93)(v) will be amended and renumbered as Rule 600(b)(93)(ii). Preexisting Rule 600(b)(93)(iii)-(iv) will contain provisions related to a new "Evaluation Period."

851 Amended Rule 600(b)(93) and amended Rule 612(a)(1) each define "Evaluation Period" differently.

Further, amended Rule 600(b)(93)(iv) will provide time for market participants to implement any reassignments of round lots and provides that the assigned round lots will be operative until the next semiannual date for a new round lot change. Specifically, round lots assigned under Rule 600(b)(93) shall be operative on (A) the first business day of May for the March Evaluation Period and continue through the last business day of October of the calendar year, and (B) the first business day of November for the September Evaluation Period and continue through the last business day of April of the next calendar year. For both round lots and minimum pricing increments, the adopted semiannual assignment dates will be the first business day in May and the first business day of November.

Like amended Rule 612, in amended Rule 600(b)(93)(iv) the Commission is adopting a one-month time period between the conclusion of each Evaluation Period and each operative date (i.e., the date on which the round lot assignment becomes effective) to provide market participants with time to implement any new round lot assignments. These changes address concerns about operational risks and will help to ensure the orderly implementation of the systems changes necessary to implement the new round lots and minimum pricing increments. Further, market participants will be able to use the one-month implementation period to communicate with investors about any upcoming changes, which will help to minimize potential investor confusion.

These amendments are responsive to commenters who suggested aligning the assignment of round lots and minimum pricing increments.[852] By aligning the timing for assigning round lot sizes to the timing for assigning minimum pricing increments, there will be fewer modifications

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852 See Hudson River Letter at 2, 4; BlackRock Letter at 10.

to market participants' systems and they will have more time to implement such systems changes. These amendments to the round lot definition address commenter concerns about systemic risk and the risk of market disruptions because market participants will only have to make systems changes two times per year for round lot assignments and tick reassignments rather than twelve and four times per year, respectively.[853] These amendments to make the assignment of round lots uniform with the assignment of minimum pricing increments will reduce potential confusion for investors because they will only have to understand two round lot assignments per year instead of twelve.

The Commission is not changing the round lot sizes, pricing tiers or the calculation used to assign round lots. As originally adopted, round lots were assigned based on the average closing price of the prior month on the primary listing exchange. Under Rule 600(b)(93)(iii), round lots will be assigned based on the average closing price during a specified month, e.g., March or September on the primary listing exchange.

In the MDI Adopting Release, the Commission explained that assigning a round lot size based on the NMS stock's average closing price on the primary listing exchange for the prior calendar month would strike "an appropriate balance between using accurate, up-to-date pricing information and avoiding the cost and complexity of over-frequent computation and potential round lot reassignment."[854] The Commission also stated that market participants are accustomed to monthly updates, so monitoring for round lot size changes and implementing systems changes to account for the monthly calculation "would not be overly burdensome or costly."[855]

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853 Id.

854 See MDI Adopting Release, supra note 10, at 18619.

855 Id.

In light of the concerns raised by commenters about potential confusion and potential operational risks due to the fact that round lots and minimum pricing increments would be changed at different times, the Commission reviewed data that compared how often round lot sizes would change if subject to monthly evaluations, as the MDI Rules previously required, to how often they would change if subject to a semiannual evaluation based on one month of prices.[856] The Commission examined the average closing prices of NMS stocks from January 2019 through September 2023 (6,052 stocks) using Bloomberg data. During this time, only 323 NMS stocks moved above or below the round lot tiers of $250.01 per share, $1,000.01 per share, and $10,000.01 per share. If round lot sizes were updated on a monthly basis, there would have been 1,012 total changes over the past five years, for an average of 17 changes per month. If round lot sizes were updated every six months, there would have been 454 total changes over the past five years, for an average of 50 changes every six months.[857] The data suggests that lengthening the time between assigning round lots will reduce the number of re-assignments. Some of the re-assignments identified using the monthly reassignment were the result of some NMS stocks shifting between round lots sizes from month to month. The shifting of round lot size tiers from month to month may increase the potential for investor confusion. This is similar

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856 See infra section VII.D.1.d for a discussion of the semiannual evaluation of minimum pricing increments. As discussed above, the Commission is aligning the assignment of round lots and minimum pricing increments. A longer round lot assignment frequency, such as annual assignments, would more likely result in round lot sizes calculated based on prices not reflective of current trading. Limiting round lot reassignments to a frequency of once every six months was determined to be sufficient to achieve the goals stated in the MDI Adopting Release, while reducing costs and complexity for market participants. See also infra notes 1594-1595 and accompanying text (discussing the impact of the semiannual evaluation period and the lag between evaluation and implementation on the accuracy of round lot assignments).

857 The Commission's analysis revealed that certain NMS stocks shifted above and below the $250 per share threshold, which resulted in the difference in number of changes between the monthly round lot updates and the semiannual round lot updates. For example, one NMS stock would have changed round lot size 24 times over five years if round lot sizes were adjusted monthly, as compared to four times if round lot sizes were adjusted semiannually.

to the concerns expressed by commenters about having asynchronous round lot and minimum pricing increments changes.

Finally, the Commission is amending Rule 600(b)(93)(v), which previously stated that a round lot for an NMS stock for which the prior calendar month's average closing price is not available is an order for the purchase or sale of 100 shares. This preexisting provision assigned new NMS stocks to a 100-share round lot because such NMS stocks that started trading intra-month did not have an average closing price from the prior calendar month upon which to make a round lot assignment.[858] As amended, preexisting section (v) will be renumbered as Rule 600(b)(93)(ii) and will be amended to state instead that any security that becomes an NMS stock during an operative period as described under new paragraph (iv) shall be assigned a round lot of 100 shares. This provision is consistent with the preexisting provision. New NMS stocks that begin trading during an operative period will not be able to have an average closing price calculated during an Evaluation Period. Further, this new language will make the round lot definition similar to Rule 612 in identifying those NMS stocks that become NMS stocks during an operative period and have not yet been an NMS stock during an Evaluation Period.

C. Final Rule - Odd-Lot Information

The Commission is adopting an accelerated implementation schedule for odd-lot information definition that is modified from the proposal in order to provide a longer time for market participants to update and modify their systems.[859] Further, the Commission is adopting amendments to Rule 603(b) under Regulation NMS, as proposed, to require the exclusive SIPs to collect, consolidate and disseminate odd-lot information. Finally, the Commission is adopting

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858 See MDI Adopting Release, supra note 10, at 18619.

859 See infra section VI.C.

amendments to the definition of odd-lot information to include the best odd-lot order, as proposed.

1. Proposed Acceleration of Odd-Lot Information Definition

The Commission proposed to accelerate the implementation of the odd-lot information definition under Rule 600(b)(59)[860] by requiring SROs to provide the data necessary to generate odd-lot information to the exclusive SIPs and to require the exclusive SIPs to collect, consolidate, and disseminate odd-lot information.[861] Specifically, the Commission proposed to amend Rule 603(b) under Regulation NMS to require the national securities exchanges and national securities associations to make all data necessary to generate odd-lot information available to the exclusive SIPs and to require the exclusive SIPs to collect, consolidate, and disseminate odd-lot information.[862]

The Commission proposed to divide Rule 603(b) into three new subsections to reflect the requirements under Rule 603(b) until the MDI Rules are implemented. As proposed, Rule 603(b)(1) governs the applicability of Rules 603(b)(2) and (b)(3) by describing the compliance

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860 The MDI Rules adopted the definition of odd-lot information in rule 600(b)(59). This provision was subsequently renumbered to Rule 600(b)(69) by the Rule 605 Amendments. 17 CFR 242.600(b)(69); Rule 605 Amendments, supra note 10.

861 Pursuant to the implementation period for the MDI Rules, odd-lot information will be collected, consolidated, and disseminated by competing consolidators, beginning during the parallel operation period. See Proposing Release, supra note 11, at 80298.

862 See proposed Rule 603(b)(3). While the MDI Rules do not require competing consolidators to disseminate all consolidated market data elements, such as odd-lot information, in consolidated market data products, the Commission proposed to require the exclusive SIPs to collect, consolidate, and disseminate odd-lot information. Under the decentralized consolidation model, competing consolidators will be permitted to design consolidated market data products with different elements of consolidated market data for their subscribers and subscribers will be able to choose competing consolidators and consolidated market data products that meet their needs. See MDI Adopting Release, supra note 10, at 18659. Under the existing exclusive SIP model, the exclusive SIPs are the only source of consolidated NMS information and—while proprietary data products offer some of the same data content, including odd-lot quotations—subscribers would have no alternative providers of *consolidated* NMS information if such data were not required to be collected, consolidated, and disseminated by the exclusive SIPs. Therefore, the Commission proposed that the exclusive SIPs be required to disseminate odd-lot information.

dates set forth in the MDI Rules. Proposed Rule 603(b)(2) governs the provision of consolidated market data by competing consolidators and self-aggregators pursuant to the decentralized consolidation model set forth in the MDI Rules. Proposed Rule 603(b)(3) governs the provision of NMS information by the exclusive SIPs, including the new requirements regarding the collection, consolidation, and dissemination of odd-lot information.

Therefore, proposed Rule 603(b)(1)(i) states that compliance with Rule 603(b)(3) is required until the date indicated by the Commission in any order approving amendments to the effective national market system plan(s) to effectuate a cessation of the operations of the plan processors that disseminate consolidated information regarding NMS stocks. Proposed Rule 603(b)(1)(ii) states that compliance with proposed Rule 603(b)(2) is required 180 calendar days from the date of the Commission's approval of the amendments to the effective national market system plan(s) required under rule 614(e).[863]

Preexisting Rule 603(b), which imposes requirements on the dissemination of consolidated market data by national securities exchanges and national securities associations, was proposed to be renumbered as Rule 603(b)(2). Proposed Rule 603(b)(3) requires every national securities exchange on which an NMS stock is traded and national securities association to act jointly pursuant to one or more effective NMS plans to disseminate consolidated information, including a national best bid and national best offer and odd-lot information, on quotations for and transactions in NMS stocks, and the effective plan or plans must provide for the dissemination of all consolidated information for an individual NMS stock through a single plan processor. The single plan processor must represent quotation sizes in such consolidated

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863 17 CFR 242.614(e). See also MDI Adopting Release, supra note 10, at 18700 n.1355.

information in terms of the number of shares, rounded down to the nearest multiple of a round lot. Additionally, every national securities exchange on which an NMS stock is traded and national securities association shall make available to a plan processor all data necessary to generate odd-lot information.

The Commission did not receive any comments on proposed Rule 603(b)(1), which added the compliance dates already adopted in the MDI Rules, or the renumbering of current Rule 603(b) as Rule 603(b)(2), and is adopting these changes, as proposed. The Commission discusses proposed Rule 603(b)(3)[864] herein, which the Commission is adopting as proposed.

a. General Comments and Response

The Commission received comments in support of the proposed acceleration of the implementation of the odd-lot information consistent with the MDI Rules from individuals, firms, exchanges, and associations.[865] Generally, individual commenters supported the proposed acceleration of the implementation of the odd-lot information definition because it would increase transparency and "because odd-lots represent the majority of trades."[866] Certain other market participants also supported the proposed acceleration of the odd-lot information definition for similar reasons, stating greater transparency would enhance price discovery,

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864 See infra section V.C.1.a; section V.D.

865 The Commission also received comment on the timing proposed to implement the odd-lot information and round lot definitions. These comments are discussed below in section VI.C.

866 See, e.g., Form Letter Type I, of which 22 comments were received, available at https://www.sec.gov/comments/s7-30-22/s73022.htm. See also e.g., Form Letter Type D, of which 255 comments were received, Form Letter Type J, of which 15 comments were received, and Form Letter Type K, of which 22 comments were received, available at https://www.sec.gov/comments/s7-30-22/s73022.htm; Letters from Aric Ott (Mar. 6, 2023); Austin Peck (Mar. 31, 2023); Colin Clarry (Mar. 6, 2023); Aron Tastensen (Feb. 23, 2023); Dave and Paula Wager (Mar. 6, 2023); Mark Rogers (Mar. 30, 2023); Erik Jansen (Mar. 31, 2023).

improve decision-making with respect to order routing, and reduce spreads.[867] Commenters further supported the acceleration of odd-lot information requirements because it would improve the quality of SIP data and "make more data accessible to investors at lower prices by introducing competition into an otherwise monopolistic data market."[868]

Certain market participants stated that accelerating the implementation of odd-lot information is not necessary and overly burdensome given the other components of the proposal.[869] One commenter supported the acceleration of the MDI Rules with respect to odd-lots but stated that "[o]ver the long run, eliminating round lots altogether…may be a better resolution."[870] In contrast, two commenters opposed accelerating the implementation of the odd-lot information definition, stating that it would increase the amount of development work required of market participants and therefore "delay the additional transparency that could be afforded by solely modifying the round lot definition."[871] Additional commenters supported acceleration of the revised round lot definition but not the odd-lot information definition, without providing a specific reason for the distinction, and generally urged the Commission to revisit comments on odd-lot dissemination.[872]

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867 See, e.g., Cboe Letter II at 10 (stating that odd-lot transactions represent a majority of trades, odd-lot quotations represent significant price improvement on Cboe's exchanges and stating "the inclusion of odd-lot quotations on the SIPs is long overdue"); IEX Letter I at 6; Nasdaq Letter I at 3, 10; MFA Letter at 13-14; Better Markets Letter I at 16-17; NYSE Letter I at 7; Cboe Letter II at 2; SIFMA AMG Letter I at 9; JPMorgan Letter at 2; Letter from Tom Davin, Senior Vice President, Software & Information Industry Association, Managing Director, Financial Information Services Division, Financial Information Services Division of the Software & Information Industry Association, dated Mar. 29, 2023 ("FISD Letter") at 1, 3.

868 See, e.g., Robinhood Letter at 5; Proof Letter at 1.

869 See, e.g., FIA PTG Letter II at 4; Hudson River Letter at 2; NYSE, Schwab, and Citadel Letter at 2; STA Letter at 8; Schwab Letter II at 6; BlackRock Letter at 12; MEMX Letter at 7.

870 Nasdaq Letter I at 3, 10.

871 See FIA PTG Letter II at 4; Hudson River Letter at 2.

872 See, e.g., NYSE, Schwab, and Citadel Letter at 2; STA Letter at 8; Schwab Letter II at 6.

The Commission is adopting proposed Rule 603(b)(3) with respect to the provision of odd-lot information, as proposed. The provision of odd-lot information within the national market system will provide significant benefits to investors by increasing transparency about better priced orders that are available in the market. The round lot definition will not provide transparency about those orders that remain odd-lots, i.e., odd-lot quotation information. As discussed above, only those NMS stocks that are priced greater than $250 will be assigned a smaller round lot size. These NMS stocks may still have odd-lots available at prices better than the round lot price. Further, the odd-lot information definition will provide transparency about better priced odd-lot orders for all NMS stocks.

While some commenters suggested that the Commission consider alternative sequencing of the proposal and expressed concern regarding the acceleration of the implementation of the odd-lot information definition: (1) ahead of other elements of MDI Rules, (2) simultaneously with minimum pricing increments, and (3) simultaneously with the changes to the round lot definition,[873] investors and market participants should be provided with the benefits of odd-lot information sooner than the originally adopted implementation schedule in the MDI Adopting Release,[874] and the adoption of the acceleration of the odd-lot information requirements should occur contemporaneously with adoption of the other requirements outlined in the Proposing Release. Timelier implementation of the odd-lot information definition allows investors to benefit from greater transparency and accessibility of better priced orders and improved execution quality; waiting to implement the definition would delay these benefits for market

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873 See, e.g., ICI Letter I at 2, 7; FIA PTG Letter II at 4-5; Robinhood Letter at 5, 44. See also supra section I.D (discussing overarching comments on the proposal in general).

874 See Proposing Release, supra note 11, at 80295.

participants.[875] Further, the implementation of the MDI Rules continues, although on a delayed basis as compared to the adopted implementation schedule. The implementation of odd-lot information on an accelerated schedule will not impede the further implementation of the remaining MDI Rules.[876]

Apart from comments regarding sequencing, certain industry participants expressed concern that adding odd-lot information, including the BOLO, to the exclusive SIPs will increase message traffic and therefore increase costs.[877] One commenter stated that the proposal would add odd-lot information to exclusive SIP data without disclosing how much the SROs would charge retail investors and broker-dealers for the new data fields.[878] The commenter, while recommending that the Commission proceed with implementation of the MDI Rules and governance changes, stated that exclusive SIP data fees are "complex and often opaque" and that while SIP data costs are charged to retail customers on a per investor basis, the cost to produce SIP data does not scale on a per investor basis.[879]

While the addition of odd-lot quotation information to the exclusive SIPs will increase the number of messages that the exclusive SIPs will have to collect and consolidate and the number of messages that will be made available to market participants, the exclusive SIPs and market participants can handle such increased message traffic. As discussed in the Proposing Release, the systems used by exchanges and other market participants can handle many levels of

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875 As discussed below, the Commission is adopting an accelerated implementation schedule for the odd-lot information definition that is modified from the proposal in order to provide a longer period of time for market participants to update and modify their systems. See infra section VI.C.

876 See infra section V.E.

877 See, e.g., FIF Letter at 13; FIA PTG Letter II at 5; Fidelity Letter at 17; FISD Letter at 3.

878 See Fidelity Letter at 17.

879 See id.

data messages at extreme low latency and should be able to adjust to the addition of odd-lot quotation information.[880] Further, the exclusive SIPs have been discussing the addition of odd-lot quotation information to SIP data for several years[881] and should be able to make the necessary adjustments to their processors in the adopted timeframe.[882] To the extent that increased message traffic increases costs for the exclusive SIPs, the Commission estimated those costs in the Proposing Release, which are discussed below.[883]

The Commission discussed the potential for new fees related to consolidated market data, which includes odd-lot information, in the MDI Adopting Release.[884] Fees imposed by the exclusive SIPs are subject to the Exchange Act and the rules thereunder. The Commission discussed the statutory standards for any potential fees for consolidated market data, which includes odd-lot information, in the MDI Adopting Release.[885] Specifically, the statutory standards that apply to fees proposed by the effective market system plan(s) include section 11A(c)(1)(C)-(D) of the Exchange Act and rule 603(a) under Regulation NMS. Proposed fees must be fair and reasonable and not unreasonably discriminatory. As discussed in the MDI Adopting Release, the Commission has historically assessed fees for data, such as the data content underlying consolidated market data of which odd-lot information is a part, using a

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880 See Proposing Release, supra note 11, at 80279 (discussing the potential increased system traffic for the proposed minimum pricing increments).

881 See Proposing Release, supra note 11, at 80297 (discussing a 2019 proposal by the CTA/CQ and UTP Plans to add odd-lot information to the exclusive SIPs).

882 See infra section VI.C (revising the compliance timeframe from 90 days as proposed to 18 months from the effective date of the Adopting Release).

883 See infra sections VII.D.5 and VIII; see also Proposing Release, supra note 11, at 80299, 80301.

884 See MDI Adopting Release, supra note 10, at 18684.

885 See MDI Adopting Release, supra note 10, at 18650, 18684.

reasonably related to cost standard.[886] To the extent that the exclusive SIPs propose to increase SIP data fees because of the addition of odd-lot information, any such new proposed fees must be filed with the Commission pursuant to rule 608, published for public comment and approved by the Commission before they can take effect.[887] Further, as discussed in the Proposing Release, expediting the inclusion of odd-lot information to the exclusive SIPs can provide additional competition to the segment of the market that subscribes to proprietary data with odd-lot information for use in visual display settings.[888]

One commenter requested confirmation that exchange proprietary data feeds could be used to provide odd-lot information to the exclusive SIPs consistent with statements in the MDI Adopting Release that odd-lot information could be made available to competing consolidators and self-aggregators (under the decentralized consolidation model) using "existing proprietary data feeds, a combination of proprietary data feeds, or a newly developed consolidated market data feed."[889] As previously stated by the Commission, the use of proprietary data feeds for delivering odd-lot information is consistent with the MDI Rules in the context of the decentralized consolidation model.[890] The use of proprietary data feeds for purposes of providing data to the exclusive SIPs may require consideration by the exclusive SIPs and the Operating

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886 See MDI Adopting Release, supra note 10, at 18684 n.1158.

887 See 17 CFR 242.608(b). See also Rescission of Effective-Upon-Filing Procedure for NMS Plan Fee Amendments and Modified Procedures for Proposed NMS Plans and Plan Amendments, Securities Exchange Act Release No. 89618 (Aug. 19, 2020), 85 FR 65470 (Oct. 15, 2020).

888 See Proposing Release, supra note 11, at 80338 (discussing how expediting the inclusion of odd-lot data into the exclusive SIPs would impact competition among data providers).

889 MEMX Letter at 7.

890 See MDI Adopting Release, supra note 10, at 18653.

Committees of the technical specifications that may be necessary for purposes of collecting and distributing such information to the exclusive SIPs.[891]

One commenter stated that "disseminating odd lot quotes on the SIP could lead investors to expect prices that are not available."[892] Odd-lot quotation information will reflect actual prices of actual orders that have been submitted by market participants. This information will provide investors with valuable information about the prices at which other market participants are willing to trade. However, as with any change, market participants may have to educate investors as to the existence of odd-lot quotation information on the exclusive SIPs.

2. Proposed Amendment to Odd-Lot Information Definition for Best Odd-Lot Orders

The odd-lot information definition includes (1) odd-lot transactions,[893] and (2) odd-lots at a price greater than or equal to the national best bid and less than or equal to the national best offer, aggregated at each price level at each national securities exchange and national securities association.[894] Accordingly, once implemented, information on odd-lot orders priced better than the NBBO will be included in the NMS information that is made available to market participants within the national market system.

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891 Under rule 603(a), an SRO is prohibited from making its core data available to vendors on a more timely basis than it makes such data available to the exclusive SIPs. In the MDI Adopting Release, the Commission stated that rule 603(a) prohibits an SRO from making its NMS information available to any person on a more timely basis (i.e., by any time increment that could be measured by the SRO) than it makes such data available to the exclusive SIPs. See MDI Adopting Release, supra note 10, at 18656.

892 See Schwab Letter II at 36.

893 Odd-lot transaction information is currently collected, consolidated, and disseminated by the exclusive SIPs. See Securities Exchange Act Release Nos. 70793 (Oct. 31, 2013), 78 FR 66788 (Nov. 6, 2013) (order approving Amendment No. 30 to the UTP Plan to require odd-lot transactions to be reported to the consolidated tape); 70794 (Oct. 31, 2013), 78 FR 66789 (Nov. 6, 2013) (order approving Eighteenth Substantive Amendment to the Second Restatement of the CTA Plan to require odd-lot transactions to be reported to consolidated tape).

894 17 CFR 242.600(b)(69); MDI Adopting Release, supra note 10, at 18613.

The Commission proposed to amend the definition of odd-lot information to include a BOLO as new Rule 600(b)(59)(iii). Specifically, for each NMS stock, the best odd-lot order to buy would mean the highest priced odd-lot order to buy that is priced higher than the national best bid, and the best odd-lot order to sell would mean the lowest priced odd-lot order to sell that is priced lower than the national best offer. Similar to the definition of the NBBO, in the event that two or more national securities exchanges or associations provide odd-lot orders at the same price, the exclusive SIPs, competing consolidators and self-aggregators would be required to determine the best odd-lot order by ranking all such identical odd-lot buy orders or odd-lot sell orders (as the case may be) first by size (giving the highest ranking to the odd-lot buy order or odd-lot sell order associated with the largest size), and then by time (giving the highest ranking to the odd-lot buy order or odd-lot sell order received first in time).[895]

a. General Comments and Response

The Commission received comments supporting the requirement to identify the BOLO from individuals[896] and market participants.[897] As stated above, many individual commenters supported publishing odd-lot information, including the BOLO, in the exclusive SIPs in order to further transparency and aid investors in making more informed trading decisions.[898] Similarly,

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895 See 17 CFR 242.600(b)(60) (defining NBBO and setting forth the manner in which the NBBO is determined "in the event two or more market centers transmit to the plan processor, a competing consolidator or a self-aggregator identical bids or offers for an NMS security").

896 See, e.g., Comment Letter Type D; Letters from Aron Tastensen (Feb. 23, 2023); Bill Goerger (Mar. 19, 2023); Carson Bruenderman (Mar. 7, 2023).

897 See, e.g., IEX Letter I at 6; Cboe, State Street, et al. Letter at 2; ASA Letter at 5; SIFMA Letter II at 4, 32; BlackRock Letter at 12. The Commission also received a comment that said that the Commission should not amend rule 603(c) to require the display of odd-lot information, but did not discuss the costs (or benefits) of such a requirement. See FIF Letter at 13. The Commission is not amending rule 603(c) in this release.

898 See, e.g., Comment Letter Type D, I, and K, available at https://www.sec.gov/comments/s7-30-22/s73022.htm; see supra notes 866 and 896.

certain other commenters viewed the additional information as a useful measure for all investors and their agents to better evaluate the best prices in NMS stocks and would enhance the ability to trade and route orders effectively as well as facilitate best execution.[899] Certain market participants that support the publication of the BOLO cautioned against requiring broker-dealers to use the metric as a benchmark against execution quality.[900] One of the commenters requested guidance regarding whether "market participants would be expected to clear the best odd-lot orders as part of ISO routing, notwithstanding that the odd-lot orders are not protected quotations."[901] Finally, a number of individual commenters that expressed support for including odd-lot information in the exclusive SIPs urged the Commission to include "odd-lot transactions" in the NBBO, citing the fact that odd-lot transactions are now a majority of the market and most prevalent among retail investors.[902]

The Commission also received comments opposing the requirement to identify the BOLO, stating the information would create ambiguity or investor confusion.[903] Some of these commenters stated that confusion would arise from the fact that a customer would expect to receive the BOLO price even though it is not a protected quote.[904] One commenter stated that the round lot and odd-lot requirements outlined in the MDI Adopting Release sufficiently provide

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899 See, e.g., IEX Letter I at 30-31; ICI Letter I at 6; Cboe Letter II at 10; BlackRock Letter at 12.

900 See, e.g., ASA Letter at 5; Fidelity Letter at 16; SIFMA Letter II at 4, 32.

901 SIFMA Letter II at 34, 43.

902 See, e.g., Comment Letter Type D, I and K; Letters from Chris Eastvedt (Mar. 6, 2023); M B (Mar. 6, 2023); Prakash Tamang (Mar. 6, 2023); Adam Aiello (Mar. 7, 2023); Shayne Gallagher (Mar. 7, 2023); Aswin Joy (Mar. 7, 2023); Daryll Fogal (Mar. 15, 2023); Bill Goerger (Mar. 19, 2023); Allie Birge (Mar. 31, 2023); Eileen Loh (Mar. 19, 2023).

903 See, e.g., Data Boiler Letter II at 3; JPMorgan Letter at 2, 7.

904 See JPMorgan Letter at 7 (stating further if the protected price is lower than the BOLO then "Rule 605 could show misleading negative price improvement while ignoring the order's size"); Fidelity Letter at 16; SIFMA Letter II at 43.

increased transparency while minimizing confusion.[905] One commenter stated that the transparency of odd-lot orders may be "gameable" such that a limit order to buy one share could change all execution quality benchmarks for brokers.[906]

As discussed below, the Commission is adopting the amendment to odd-lot information to include a BOLO, as proposed.[907] While initially market participants may need to explain to their customers about the existence of the BOLO, this new data element is not expected to confuse investors. Investors are already able to see odd-lot transaction information and, upon implementation, the BOLO will provide them with information about the best odd-lot quotations. The BOLO is an informative, useful piece of information for investors to use when considering prices related to NMS stocks. Among other uses, the BOLO may serve as the benchmark execution price for execution quality statistics in rule 605 reports that measure price improvement relative to the best available displayed price.[908] However, in rule 605 reports, the price improvement statistics relative to the best available displayed price will be a supplement to, rather than a replacement for, price improvement statistics relative to the NBBO.[909] Further, rule 605 reports present information, including price improvement, in order size categories based on

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905 JPMorgan Letter at 7.

906 Fidelity Letter at 16 (supporting "adding better-priced odd lots to the SIP when this information provides actionable information to the marketplace, such as helping broker-dealers meet their best execution obligations" but urging the Commission to "balance the advantages and disadvantages of odd-lot transparency," such as the ability to influence execution quality statistics).

907 The Commission is adopting this amendment to the definition of odd-lot information in Rule 600(b)(69)(iii). See supra note 860.

908 See 17 CFR 242.600(b)(14) (defining best available displayed price) and 17 CFR 242.605(a)(1)(ii)(M) through (Q) (requiring rule 605 statistics relative to the best available displayed price). Entities that prepare rule 605 reports will be required to use the BOLO to compare the best available odd-lot price to the NBBO and determine the best available displayed price. In some cases, the best available displayed price may be the NBBO.

909 See Rule 605 Amendments, supra note 10.

notional order size and whether the order is for a fractional share, odd-lot, or round lot.[910] These provisions provide more context for price improvement statistics that consider the best available odd-lot price and thus mitigate concerns about "gaming" execution quality reports. Further, rule 605 reports represent monthly, aggregated execution quality statistics and thereby dilute the effect of an odd-lot price at one specific point in time.

Several commenters stated that odd-lot quotations should be included in the NBBO.[911] Odd-lot quotations are currently included in the calculation of the NBBO when they are aggregated into round lots for purposes of providing an exchange's best bids and offers to the exclusive SIPs.[912] Pursuant to Regulation NMS, bids and offers can only be in round lot sizes,[913] therefore, the NBBO can only be reflected in round lot sizes. The round lot definition as adopted in the MDI Rules, will categorize certain orders that are currently odd-lots as round lots based on their price, and as a result, quotations and orders that were previously defined as odd-lots will be eligible to establish the NBBO.[914] Orders that remain odd-lots under the new definitions are not bids and offers and therefore do not independently contribute to establishing the NBBO.

The identification of a BOLO will assist investors in assessing the current state of the market for individual NMS securities. The BOLO will reflect the best odd-lot price consolidated across all national securities exchanges and national securities associations and is therefore

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910 See Rule 605 Amendments, supra note 10.

911 See supra note 902.

912 See, e.g., NYSE Rule 7.36(b)(3); Nasdaq Equity 4, Rule 4756(c)(2); Cboe BZX Rule 11.9(c)(2). See also supra note 732.

913 17 CFR 242.600(b)(16) (defining "bid or offer" to mean "the bid price or the offer price communicated by a member of a national securities exchange or member of a national securities association to any broker or dealer, or to any customer, at which it is willing to buy or sell one or more round lots of an NMS security, as either principal or agent, but shall not include indications of interest.").

914 See supra section V.B.1.

consistent with the goals set forth in section 11A of the Exchange Act because it will make information about quotations in NMS stocks available to broker-dealers and investors and will enhance the usefulness of odd-lot information. Although odd-lot liquidity better than the NBBO often resides at multiple price levels and information reflecting all of these odd-lot prices is already included in the definition of odd-lot information, requiring the identification and dissemination of the best of all such inside the NBBO odd-lots on both the buy and sell side will help inform market participants of the best possible prices at which their orders (or their customers' orders) could—in whole or in part—be executed. The identification and dissemination of the price, size, and market of the best odd-lot orders will also enhance the ability of market participants to make effective trading and order routing decisions using NMS information and facilitate best execution. One commenter requested guidance on how to treat odd-lot orders for order routing purposes.[915] The Commission stated in the MDI Adopting Release that odd-lot information may be relevant to a broker-dealer's ability to analyze and achieve best execution.[916] As the Commission stated in the MDI Adopting Release, while odd-lot information, which will now include the BOLO, "may be relevant to broker-dealers' best execution analyses and, in many cases, will facilitate the ability of broker-dealers to achieve best execution for their customer orders, the Commission . . . is not setting forth minimum data elements needed to achieve best execution and does not expect that all market participants will

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915 See supra note 901.

916 See MDI Adopting Release, supra note 10, at 18605 for a discussion of the implications of expanded consolidated market data on the duty of best execution.

need to purchase the most comprehensive or fastest consolidated market data product available."[917]

D. Display of Round Lots and Odd-Lot Information

Currently, the exclusive SIPs represent quotation sizes in SIP data in terms of number of round lots. For example, for an NMS stock for which a round lot is 100 shares, a bid for 200 shares of that stock would be represented as a bid for "2" in SIP data.

Under the MDI Rules, competing consolidators are required to represent a round lot as the number of shares rounded down to the nearest multiple of a round lot.[918] For example, a 275-share buy order at $25.00 for a stock with a 100-share round lot would be disseminated as "200."[919] Accelerated implementation of the round lot definition will require the exclusive SIPs to revise their systems to reflect this change. Therefore, in proposed Rule 603(b)(3), the Commission proposed to require each exclusive SIP to, among other things, represent quotation

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917 Id. at 18605-06. Consolidated market data products will be developed by competing consolidators once the decentralized consolidation model is implemented. See rule 600(b)(25), 17 CFR 242.600(b)(25) (defining consolidated market data product).

918 Under the MDI Rules, the definition of "core data" requires competing consolidators to represent certain core data elements, including the best bid and best offer, the NBBO, and protected quotations in terms of the number of shares, rounded down to the nearest multiple of a round lot. 17 CFR 242.600(b)(26)(iii). See also 17 CFR 242.600(b)(26) (defining "core data"). The MDI Rules adopted the definition of "core data" in rule 600(b)(21). This provision was subsequently renumbered to rule 600(b)(26) by the Rule 605 Amendments. See Rule 605 Amendments, supra note 10.

919 See MDI Adopting Release, supra note 10, at 18615. Through the definition of "odd-lot information," the MDI Rules also require odd-lots priced at or better than the NBBO to be represented in the aggregate at each price level at each national securities exchange or national securities association rather than on an order-by-order basis. 17 CFR 242.600(b)(69)(ii). See also 17 CFR 242.600(b)(26)(i)(H) (including "odd-lot information" as an element of core data). The MDI Adopting Release explained that "[a]ggregating better-priced odd-lots at each price level at each exchange …. means that better-priced odd-lot orders will be represented in core data in terms of the total number of shares available at each price level at each exchange rather than on an order-by-order basis. For example, if the NBB for XYZ, Inc. is 100 shares at $25.00, and there are three orders of five shares and two orders of ten shares at $25.01 on Exchange A, a competing consolidator's core data product would show 35 shares at $25.01 on Exchange A." MDI Adopting Release, supra note 10, at 18613 n.199. Therefore, quotations for odd-lot orders priced better than the NBBO are required to be displayed as the number of shares available in an odd-lot size that are aggregated at the same price.

sizes in consolidated information in terms of the number of shares, rounded down to the nearest multiple of a round lot.

1. Comments and Response

The Commission received comments on the display requirement adopted as part of the MDI Rules.[920] One commenter stated that, for mixed lot orders, the total number of shares—both the round lot and odd-lot portions—should be included as consolidated market data.[921] Another commenter stated that, by requiring that the number of shares at each price level be displayed at the round lot level, the display requirement would make consolidated market data less useful and less competitive relative to exchange proprietary data feeds, which display the total number of shares at a price level.[922] The commenter also stated that basing quotations on the number of shares rounded to the nearest round lot (rather than based on round lots) could result in operational risk and investor confusion.[923]

As stated above, the display requirement was adopted as part of the MDI Rules. The Commission discussed the reasons for adopting the display requirement in the MDI Adopting Release.[924] However, in response to the commenter that suggested the inclusion of both the round lot and odd-lot portions of mixed lot orders,[925] since odd-lot information will be disseminated by the exclusive SIPs,[926] the total number of shares of odd-lots priced at or better than the NBBO will be included in SIP data. Through the definition of odd-lot information, the

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920 See FIF Letter at 13; SIFMA Letter II at 34, 42.

921 See FIF Letter at 13.

922 See SIFMA Letter II at 42.

923 See SIFMA Letter II at 34.

924 See MDI Adopting Release, supra note 10, at 18615.

925 See FIF Letter at 13.

926 See amended Rule 603(b)(3).

MDI Rules require odd-lots priced at or better than the NBBO to be represented in the aggregate at each price level at each national securities exchange or national securities association rather than on an order-by-order basis.[927]

In response to the commenter that stated that displaying quotations in round lot sizes would undermine the usability and competitiveness of consolidated market data as compared to exchange proprietary data feeds,[928] the Commission described the reason for displaying quotations in round lot sizes in the MDI Adopting Release, which remains relevant to the implementation of the round lot definition by the exclusive SIPs.[929] Further, the Commission recognized in the MDI Adopting Release that different market participants need differing amounts of information to meet different trading objectives.[930] The MDI Rules are intended to reduce information asymmetries between users of proprietary feeds and users of SIP data by enhancing the content of information made available in the national market system to enable market participants to trade efficiently and competitively.[931] For example, the inclusion of odd-lot quotations and the round lot definition will allow investors to see, and more readily access, better priced orders in smaller sizes.[932] As discussed above, the total number of shares of odd-lots priced at or better than the NBBO will be included in data that is made available by the exclusive SIPs. Certain market participants may choose to continue to purchase exchange proprietary data products if they require more granular information about odd-lots. Here, the

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927 17 CFR 242.600(b)(69)(ii). See also supra note 919.

928 See SIFMA Letter II at 42.

929 See MDI Adopting Release, supra note 10, at 18615.

930 See MDI Adopting Release, supra note 10, at 18600.

931 See MDI Adopting Release, supra note 10, at 18601.

932 See MDI Adopting Release, supra note 10, at 18601, 18607.

Commission's amendment is limited in reach – it extends the MDI Rules' display requirement to the exclusive SIPs as part of the accelerated implementation of the round lot and odd-lot information definitions, changing only the entity responsible for displaying this information—from competing consolidators to the exclusive SIPs. This change by itself should not impact the utility or competitiveness of consolidated market data. With respect to the commenter's concerns that the display requirement would result in operational risk and investor confusion,[933] the required display of mixed lot orders rounded down to the nearest multiple of a round lot was previously adopted in the MDI Rules for competing consolidators.[934] In the MDI Adopting Release, the Commission stated that the preexisting convention of displaying the number of round lots "could be confusing" when applied to the MDI Rules' round lot definition, which, once implemented, will assign varying round lot sizes to individual NMS stocks based on stock price.[935] Further, the Commission explained that rounding down to the nearest round lot multiple would ensure that the elements of core data would reflect orders of meaningful size, and that for the NBBO, rounding down would help ensure that the protected portion of the order is clearly represented, to address concerns about impacts on investor confidence and investor confusion that potentially could result from the display of unprotected size at the NBBO.[936] The Commission also stated that odd-lots priced at or better than the NBBO, including the odd-lot

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933 See SIFMA Letter II at 34.

934 17 CFR 242.600(b)(26)(iii).

935 See MDI Adopting Release, supra note 10, at 18615.

936 See MDI Adopting Release, supra note 10, at 18615 n.236. Rule 611 of Regulation NMS requires trading centers to have policies and procedures that are reasonably designed to prevent "trade-throughs" on that trading center of protected quotes in NMS stocks, subject to specified exceptions. 17 CFR 242.611. Rule 611 currently only applies to round lots. Specifically, rule 611 applies to "protected quotations" which means "protected bid[s] or []protected offer[s]." 17 CFR 242.600(b)(82). "Protected bid or protected offer," as defined in rule 600(b)(81), refers to "a quotation," defined in rule 600(b)(86), which in turn refers to "a bid or an offer," defined in rule 600(b)(16), which, as noted above, only applies to round lots. See supra note 913 and accompanying text.

portion of a mixed lot order at the NBBO, will be included in core data.[937] The Commission is extending this display requirement to exclusive SIPs as part of the accelerated implementation of the round lot and odd-lot information definitions. There should not be any new operational risks or investor confusion arising from this change because only the entity responsible for displaying the information is changing.

The Commission is adopting Rule 603(b)(3) as proposed.

E. MDI Rules Implementation

Some commenters discussed the benefits of the MDI Rules[938] and expressed concern that the accelerated implementation of the round lot and odd-lot information definitions could indefinitely delay implementation of the remainder of the MDI Rules,[939] stating that these proposed changes were not a substitute for implementation of all of the MDI Rules.[940] Some commenters suggested that the changes proposed in the Regulation NMS Proposal should be postponed until the full implementation of the MDI Rules.[941] Some commenters also raised concerns that the Commission was separately accelerating the implementation of the round lot and the odd-lot information definitions apart from the other components of the MDI Rules.[942] One commenter stated that "full implementation of the MDI Rules" is "a necessary first step for any significant changes to market structure," and whether or not fully implemented, "an

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937 See MDI Adopting Release, supra note 10, at 18615 n.236; see also supra note 919.

938 See, e.g., Schwab Letter II at 36; FIA PTG Letter II at 5; Robinhood Letter at 46-47.

939 See, e.g., JPMorgan Letter at 7; Citadel Letter I at 26; ICI Letter I at 2-3 n.8; Robinhood Letter at 5. See also Schwab Letter II at 36.

940 See SIFMA Letter II at 44. This commenter and another commenter stated that the Commission has not taken action to ensure the implementation of the full set of MDI Rules since disapproving the proposed fees and proposed amendments to the current NMS plans for consolidated market data in 2022. Id.; SIFMA AMG Letter I at 9. See also Fidelity Letter at 4; FIA PTG Letter II at 5.

941 See, e.g., SIFMA Letter II at 44; Robinhood Letter at 5.

942 See, e.g., Robinhood Letter at 5, 38, 41-42, 43, 47, 48, 49; JPMorgan Letter at 7; Citadel Letter I at 26.

indispensable component of the 'baseline' against which this proposal must be measured and justified."[943]

Despite delays in the process,[944] the implementation of the MDI Rules continues to be a Commission priority. In September 2023, the Commission issued an amended order directing the SROs to file a proposed new single national market system plan regarding consolidated equity market data.[945] Consolidation of the multiple Equity Data Plans into a single, new equity data plan would modernize the governance of the existing Equity Data Plans.[946]

The Commission disagrees with comments that recommended delaying implementation of the Regulation NMS Proposal until the full implementation of the MDI Rules.[947] Due to the delayed implementation of the MDI Rules, the Commission proposed to accelerate the implementation of the round lot and odd-lot definitions because these definitions can be efficiently implemented under the current exclusive SIP model.[948] Not doing so would unnecessarily delay the benefits of the round lot and odd-lot information definitions to investors and market participants. One goal in adopting the round lot definition was to increase transparency about the better priced orders available in the market by allowing each exchange's BBO and the NBBO for an NMS stock to be based upon smaller, potentially better priced orders,

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943 Robinhood Letter at 49. See also Robinhood Letter at 44, 46-49. See also infra section VII.C.3.

944 See supra notes 73-76 and accompanying text.

945 See supra note 78.

946 Rule 614(e) of the MDI Rules requires that an amendment to the effective national market system plan(s) be filed with the Commission to conform such plan(s) to the decentralized consolidation model. 17 CFR 242.614(e).

947 See, e.g., SIFMA Letter II at 44; Robinhood Letter at 5; see also Robinhood Letter at 42, 49.

948 See Proposing Release, supra note 11, at 80296 n.359.

which will also improve market participants' ability to access these orders.[949] Waiting to implement the round lot definition would delay these benefits for market participants. Further, full implementation of the MDI Rules will not address the issues discussed above related to the minimum pricing increments for certain NMS stocks, the access fee caps for protected quotations and exchange fees.[950] Finally, as discussed below, the eventual implementation of the MDI Rules is part of the baseline for the amendments to Rules 610 and 612.[951]

VI. Compliance Dates

The Commission proposed different compliance dates for the individual proposed rule amendments. As discussed below in the relevant sections, the Commission received several comments on the proposed compliance dates.[952] The Commission is adopting compliance dates that are longer than proposed.[953]

Specifically, for the reasons discussed below, the amendments adopted herein will have the following compliance dates:

Rules 600(b)(89)(i)(F) and 612: The first business day of November 2025.

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949 See Proposing Release, supra note 11, at 80294. For more details, see MDI Proposing Release, supra note 744, at 16743.

950 See supra sections III.A, IV.C, and IV.E.

951 See infra section VII.C.3.

952 See, e.g., NYSE Letter I at 7-8; CTA, CQ, UTP Plans Operating Committees Letter at 3; FISD Letter at 2, 3, 4; Nasdaq Letter I at 3; Cboe Letter II at 11; FIF Letter at 14; Cboe Letter III at 10 n.18.

953 In addition, with respect to the compliance dates, several commenters requested the Commission consider the interaction between the proposed rules and other recent Commission rules. In determining compliance dates, the Commission considers the benefits of the rules as well as the costs of delayed compliance dates and the potential overlapping compliance dates. For reasons discussed throughout the release, to the extent that there are costs from overlapping compliance dates, we expect the benefits of the rules to justify such costs. See infra section VII.D.6 for a discussion of the interactions of the final rules with certain other Commission rules.

Rules 600(b)(89)(iv), 600(b)(93) and 603(b)(3) (with respect to the requirement that the effective national market system plans to disseminate consolidated information shall provide for the dissemination of all consolidated information for an individual NMS stock through an exclusive SIP, and that the exclusive SIPs must represent quotation sizes in such consolidated information in terms of the number of shares, rounded down to the nearest multiple of a round lot): The first business day of November 2025.

Rule 610: The first business day of November 2025.

Rules 600(b)(69) and 603(b)(3) (with respect to the requirement that every national securities exchange on which an NMS stock is traded and national securities association must make available to the exclusive SIPs all data necessary to generate odd-lot information, and the collection, consolidation and dissemination of odd-lot information by the exclusive SIPs): The first business day of May 2026.

A. Final Rule 612 Compliance Date

In the Proposing Release, the Commission detailed a staggered implementation period that would cover five quarters for the proposed amendments to Rule 612. The Commission proposed the implementation period to provide the market and market participants with time to implement the proposed variable minimum pricing increments as well as to facilitate an orderly transition. The amendments to Rule 612 adopted today are modified from those that were proposed. Accordingly, the Commission is adopting a modified implementation schedule and compliance date.

One commenter suggested that the Commission direct the SROs to develop a phased implementation schedule for the reduced minimum pricing increment, "[c]onsistent with the prior implementation of decimalization" and described several steps to be considered in an

implementation plan.[954] Because the amendments to Rule 612 have been modified to require the addition of only one minimum pricing increment, the compliance date discussed below will provide the SROs and other market participants sufficient time to implement the changes and a further phased implementation schedule is unnecessary. The move to decimalization in 2000-2001 was more complicated as it involved changes to SRO rules that specified several different increments that were fractions of a dollar and required systems changes to accommodate decimals instead of fractions.[955] The amendment to Rule 612 will be less complicated because it will not require changes to SRO rules and the systems that are in place today, while needing updates, already can accommodate sub-penny increments. Further, the amendments adopted require less changes than what were proposed.

The amendments to Rule 612 will require the primary listing exchanges to evaluate each NMS stock during an Evaluation Period to calculate their TWAQS and the primary listing exchanges will have to provide a minimum pricing increment indicator to the exclusive SIPs for dissemination. The Evaluation Periods will be conducted on a semiannual basis, rather than a quarterly basis as proposed. Further, the amendments will require market participants to update and modify their systems, such as order handling and processing systems, to accommodate the one new minimum pricing increment, rather than the three new minimum pricing increments that were proposed. Market participants' systems will have to be updated and modified to accommodate the assignment of minimum pricing increments for quotes and orders priced $1.00 or greater to each NMS stock on a semiannual basis, rather than a quarterly basis as proposed.

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954 See FIF Letter at 2, 8.

955 For a description of the move to decimalization, see Staff Decimalization Report, supra note 26.

The systems updates necessary for implementing the amendment to Rule 612 are less burdensome than what was proposed.

The Commission has considered the systems changes that will be necessary to implement the amendments to Rules 600(b)(89)(i)(F) and 612 and is assigning the compliance date for amended Rule 612 to be the first business day of November 2025. In determining this compliance date, the Commission considered the systems changes that must be completed and the date by which the TWAQS can be calculated during an Evaluation Period after the systems changes could be completed. This compliance date is sufficient for facilitating an orderly transition to the amended Rule 612.

B. Final Rule 610 Compliance Date

The Commission proposed that compliance with the amendments to Rule 610 would have occurred during the implementation period proposed for the amendments to Rule 612, discussed above.[956] The proposed access fee caps would have also had a staggered implementation to reflect the proposed implementation of the proposed minimum pricing increments. Specifically, compliance with the proposed 10 mils access fee cap would have been at the same as the proposed $0.005 minimum pricing increment, and compliance with the proposed 5 mils access fee cap would have been at the same time as the proposed $0.001 minimum pricing increment.[957]

As described above, the Commission has modified amendment to Rule 612 and has also modified the compliance date for the Rule 612 amendments. Further, the Commission has modified the amendment to Rule 610 such that the access fee cap structure is retained and only the level of the caps has been reduced. The Commission is reducing the access fee caps under

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956 See Proposing Release, supra note 11, at 80284.

957 See Proposing Release, supra note 11, at 80284 n.249.

Rule 610 to accommodate the new pricing increments as well as to address distortions in the market associated with fee and rebate models.[958] Accordingly, the Commission is modifying the compliance date for the final Rule 610 amendments to coincide with the compliance date for Rule 612. The national securities exchanges will have to file proposed rule changes with the Commission pursuant to section 19(b) and rule 19b-4[959] to adjust their fee schedules to reflect the new lower access fee caps. Further, the national securities exchanges will have to file proposed rule changes to adjust any fee or rebate that is not determinable at the time of execution.

The Commission is adopting a first business day of November 2025 compliance date for the amendments to Rule 610. This date provides the national securities exchanges with time to assess their fee schedules and file proposed rule changes pursuant to section 19(b) and rule 19b-4 to adjust their fee schedules in order to comply with Rule 610 as amended.

C. Final Compliance Date for Round Lot and Odd-Lot Information

In the Proposing Release, the Commission proposed to require compliance with the odd-lot information and round lot definitions, including, as required under proposed Rule 603(b), that national securities exchanges and associations make the data available to the exclusive SIPs, that the exclusive SIPs represent quotation sizes in consolidated information in terms of the number of shares, rounded down to the nearest multiple of a round lot, and that the exclusive SIPs disseminate odd-lot information as defined in Rule 600(b)(69)[960] 90 days from Federal Register publication of any Commission adoption of an earlier implementation of the round lot and odd-

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958 See supra section IV.D.1.

959 See 15 U.S.C. 78s(b); 17 CFR 240.19b-4.

960 See supra note 719.

lot information definitions.[961] The Commission explained that the proposed compliance date would significantly move up the date by which round lot and odd-lot information would be more widely available in the national market system.[962]

Several commenters raised concerns about the proposed compliance date, stating that 90 days was not enough time to implement the round lot and odd-lot information definitions.[963] In stating that a longer timeframe was needed, some commenters stated their views of the challenges entailed in implementing the changes.[964] One commenter stated, "[t]he technical and operational requirements to implement the definition changes will necessitate distinct product changes in the systems of literally hundreds of exchanges, vendors, and subscribers, each with different development priorities and system capabilities."[965] The commenter stated that 90 days would not be enough time for the exclusive SIPs, data vendors and subscribers to accommodate the changes, and cautioned that "hastily made changes or missed delivery dates could result in not just a failure to provide odd-lot quotation data but also disrupt the flow of other core data to the market."[966] The commenter urged the Commission not to adopt the 90-day compliance timeframe and instead, after adoption of the Proposing Release, allow time for industry

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961 See Proposing Release, supra note 11, at 80300; see id. at n.399 and accompanying text.

962 See Proposing Release, supra note 11, at 80298.

963 See, e.g., NYSE Letter I at 7-8; CTA, CQ, UTP Plans Operating Committees Letter at 3; MEMX Letter at 7; FISD Letter at 2, 3, 4; Nasdaq Letter I at 3; Cboe Letter II at 11; FIF Letter at 14; Cboe Letter III at 10 n.18. See also Fidelity Letter at 16.

964 See, e.g., NYSE Letter I at 7-8; CTA, CQ, UTP Plans Operating Committees Letter at 2, 3; FISD Letter at 2, 3, 4; FIF Letter at 14; Cboe Letter II at 11.

965 See FISD Letter at 3.

966 Id.

consultation to develop an implementation plan.[967] Two commenters, while supporting the odd-lot information definition adopted in the MDI Rules, recommended only implementing the BOLO due to the complexity and time it would take to implement the odd-lot information definition by many market participants.[968]

Three commenters suggested an implementation timeframe of at least one year.[969] One commenter explained that the changes to the round lot definition would require programming changes by the exclusive SIPs and the market participants that receive SIP data, as well as testing of the changes at the exchanges, exclusive SIPs and customer levels,[970] and that it would likely take longer than one year for the exclusive SIPs and exchanges to implement the proposed odd-lot changes.[971] The Operating Committees for the Equity Data Plans stated that the implementation timeframe for the exclusive SIPs would likely extend beyond one year due to, among other things, "the time needed for system design, [to] procure necessary equipment, and accommodate industry testing."[972] Another commenter stated that the proposed 90-day timeframe was too aggressive, did not consider "technical realities," and suggested an implementation period of at least one year.[973]

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967 See FISD Letter at 4. The commenter stated that the Operating Committees of the Equity Data Plans considered a 10-12 month implementation process in their proposal to add odd-lot data to the exclusive SIP feeds. Id.

968 See BlackRock Letter at 12. See also MEMX Letter at 7.

969 See NYSE Letter I at 8; CTA, CQ, UTP Plans Operating Committees Letter at 3; Nasdaq Letter I at 3.

970 See NYSE Letter I at 7.

971 See NYSE Letter I at 8.

972 CTA/CQ/UTP Plans Operating Committees Letter at 2, 3.

973 See Nasdaq Letter I at 3.

In light of the comments, the Commission is modifying the compliance date for the round lot and odd-lot information definitions. For implementation of the round lot definition[974] and the round lot indicator,[975] the compliance date will be the first business day of November 2025. The Commission calculated this deadline based on two main factors. First, the compliance date is approximately 12 months after the effective date, which is consistent with what commenters suggested was necessary for systems changes and testing. Second, the compliance date provides sufficient time for any exchanges that have defined round lots in their rules to file proposed rule changes pursuant to section 19(b) of the Exchange Act[976] and rule 19b-4[977] thereunder to reflect the new round lot definition.[978]

The compliance date for the odd-lot information definition[979] and Rule 603(b)(3) (with respect to the requirement that every national securities exchange on which an NMS stock is traded and national securities association must make available to the exclusive SIPs all data necessary to generate odd-lot information, and the collection, consolidation and dissemination of odd-lot information by the exclusive SIPs) will be the first business day of May 2026, which is approximately 18 months after the effective date of the Adopting Release. The Commission is providing a modified compliance date for the odd-lot information definition, consistent with what industry comment suggested was necessary for technical and operational requirements,[980] due to several factors. First, the exclusive SIPs will likely have to make more changes to their

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974 Rule 600(b)(93).

975 Rule 600(b)(89)(i)(E) and Rule 600(b)(89)(iv).

976 15 U.S.C. 78s(b).

977 17 CFR 240.19b-4.

978 See Proposing Release, supra note 11, at 80300 n.408.

979 Rule 600(b)(69).

980 See supra notes 969 and 973 (suggesting an implementation process of approximately one year).

systems to accommodate the odd-lot information definition than to implement the round lot definition. Specifically, the exclusive SIPs will need to collect more data, consolidate it, and disseminate it as odd-lot information. In addition, the exclusive SIPs will need to calculate and disseminate the BOLO. The Commission continues to believe that both the changes to the odd-lot information definition and the dissemination of the BOLO are independently important, and the additional time allotted to comply with the odd-lot information definition addresses the concerns from commenters regarding the complexity or operational risks that may arise with making odd-lot information changes in a compressed timeline. Second, the effective national market system plan(s) may also need to assess whether plan amendments will be necessary to conform such plans to the odd-lot information definition, and to file any such amendments with the Commission pursuant to rule 608. Finally, market participants may need to update their systems that accept SIP data to reflect odd-lot information.

Accordingly, extending the compliance deadlines for the implementation of the round lot and odd-lot information definitions will address the concerns raised by commenters and provide additional time for market participants to make the changes necessary to implement the definitions.

VII. Economic Analysis

A. Introduction

The most common method of trading in NMS stocks by registered exchanges today is the limit order book matching system, a mechanism that securities exchanges use to bring together orders of multiple buyers and sellers of securities and have those orders interact. It acts as a central hub where participants' priced buy and sell orders can be ranked, displayed, and matched based on programmed

rules established by the providing registered exchange. As such, the limit order book matching system facilitates efficient and competitive markets.[981]

Imagine an order book in which a buyer's or seller's order could be displayed at any pricing increment, no matter how small. In this scenario, assume a liquidity provider wants to buy a stock. The provider sees the book with the prices at which others are willing to buy. Because in this hypothetical market there are no restrictions on an entry price point, the liquidity provider can jump ahead of those other providers by offering to buy at a price that is infinitesimally higher. This is what is known as "pennying."[982] The problem with pennying is that it creates a disincentive for liquidity providers to post buy or sell orders, because they know that a second trader can step ahead with an infinitesimally better price. This leads to lower priced offers to buy and higher priced offers to sell – namely a wider quoted bid-ask spread.

Recognizing this market failure, the Commission in 2005 adopted[983] a market-wide requirement that venues could not display, rank, or accept orders in increments less than a penny.[984] The 2005 adoption of Rule 612 limited the scope of pennying, but it did so at the inevitable cost of introducing a floor, namely one cent, below which the quoted bid-ask spread could not fall.

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981 See Anthony Clarke, Demystifying the Central Limit Order Book (CLOB): Everything You Need to Know (Apr. 21, 2023), available at https://www.nasdaq.com/articles/demystifying-the-central-limit-order-book-clob-everything-you-need-to-know.

982 See supra section I.A.1.

983 See generally, Regulation NMS Adopting Release, supra note 4.

984 Specifically, preexisting Rule 612 of Regulation NMS prohibited a national securities exchange, national securities association, ATS, vendor, or broker or dealer from displaying, ranking, or accepting quotations, orders, or indications of interest in any NMS stock priced in an increment smaller than $0.01 if the quotation, order, or indication of interest is priced equal to or greater than $1.00 per share. If the quotation, order, or indication of interest is priced less than $1.00 per share, the minimum pricing increment is $0.0001.

Though a minimum tick is necessary, placing a floor on the spread introduces distortions into the market. The price of liquidity will be artificially high for some stocks, leading to a surplus, similar to a goods market for which prices were artificially high. This creates rents which accrue to some market participants at the expense of others. By reducing the minimum pricing increment for a defined subset of stocks, the adopted amendments to Rule 612 free the price of liquidity from its current constraint, allowing it to approach its natural level. At the same time, as described in greater detail below, the adopted amendments maintain a minimum (but smaller) pricing increment necessary for the proper functioning of financial markets' limit order books.

Freeing the spread from the binding constraint of one penny will bring a number of benefits, including lower transaction costs. For some stocks currently constrained at a penny, the spread will, under the amended rules, at times be a half-penny, a substantial reduction in the quoted price of accessing liquidity. This reduction, while beneficial, brings into the spotlight the cap on the access fee, which has been 0.30 cents. Absent a reduction in the maximum access fee, a round-trip buy and sell for stocks quoted at the new half-penny tick would require paying more in fees (0.60 cents) than in the spread itself (0.50 cents).

The practice of charging at or near the access fee cap has persisted over time. Regulation NMS establishes the NBBO. Because the NBBO is protected,[985] many exchanges charge the maximum amount allowed to access the quote. This allows the exchange to subsidize liquidity providers with a rebate, reducing spreads (to acquire more volume, due to traders' need to access the protected quote). While the quoted spread may be lower, the cost to investors is not; this is

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985 See supra note 42 and accompanying text discussing and defining protected quotes.

because gains from the lower spread are counteracted by the access fee. On the other hand, the high access fee and rebate can lead to a loss of price coherence when the spread is less than twice the fee. For stocks that remain tick constrained, as some may, the rebate distorts the supply of liquidity. Finally, fees and rebates that are high as a percentage of the quoted spread introduce complexity, and potential conflicts of interest. Lowering the access fee to 10 mils restores price coherence and alleviates these costs.

The Commission is also requiring that these fees and rebates be determinable at the time of trade execution. Opacity and complexities in current exchange fees and rebates make these more distortive than otherwise.[986] With new Rule 610(d), the Commission is taking an incremental step in ameliorating the opacity in fees and rebates, reducing information asymmetries and lessening the potential for agency conflict between brokers and their customers.

Finally, the Commission has accelerated the implementation of the round lot, and odd-lot information definitions while providing more time for the necessary systems changes to implement the definitional changes than what was proposed. These amendments will allow the benefits of these rules to accrue to market participants in a timely manner.

Below, we explain why these amendments increase efficiency and competition and bring benefits that will accrue to the broad range of participants in U.S. equity markets. We also discuss the costs of these amendments. The Commission has considered the economic effects of the amendments and, wherever possible, the Commission has quantified the likely economic

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986 As discussed in sections VII.D.2, VII.D.3, and VII.E.1, fees and rebates create a potential conflict for a broker in situations where transaction fees, which are paid by the broker, potentially conflict with execution quality, which is incurred by the customer. This conflict, if acted on, can lead to inefficient order routing and worse transaction outcomes for customers; it can also lead to an inefficient incorporation of information into stock prices, harming market efficiency.

effects of the amendments.[987] The Commission is providing both a qualitative assessment and quantified estimates of the potential economic effects of the amendments where feasible. The Commission incorporated data and other information to assist it in the analysis of the economic effects of the amendments. However, as explained in more detail below, the Commission is unable to quantify certain economic effects because the Commission does not have, and in certain cases cannot reasonably obtain, data that may inform the Commission on certain economic effects. Further, even in cases where the Commission has data, it is not practicable to quantify certain economic effects due to the number and type of assumptions necessary, which render any such quantification unreliable. Our inability to quantify certain costs, benefits, and effects does not imply that such costs, benefits, or effects are less significant.

B. Broad Economic Considerations

1. Liquidity and Spread

A key component of market liquidity is the limit order book. Liquidity providers submit limit orders to buy ("bid") and sell ("ask") stock at specified prices and quantities. Liquidity demanders trade against these limit orders. The quoted (bid-ask) spread for a stock is the difference between the lowest displayed ask price and the highest displayed bid price.[988] As

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987 Section 3(f) of the Exchange Act requires the Commission, whenever it engages in rulemaking and is required to consider or determine whether an action is necessary or appropriate in the public interest, to consider, in addition to the protection of investors, whether the action will promote efficiency, competition, and capital formation. Additionally, section 23(a)(2) of the Exchange Act requires the Commission, when making rules under the Exchange Act, to consider the impact such rules will have on competition. Exchange Act section 23(a)(2) prohibits the Commission from adopting any rule that would impose a burden on competition not necessary or appropriate in furtherance of the purposes of the Exchange Act.

988 Investors can also execute trades on other "dark" venues that do not display quotes. But because quotes are not displayed on these venues, the investor could not be certain of the execution price or of the number of shares available. See Proposing Release, supra note 11, at 80287 (addressing trading centers that do not display protected quotes).

discussed in the Proposing Release, standard economic theory suggests that liquidity providers in a competitive market will compete to provide liquidity until the spread—i.e., their compensation for providing liquidity—is equal to the break-even point given the costs of liquidity provision.[989] Absent fees, rebates, and a minimum pricing increment, this break-even point for liquidity provision represents the lowest bid-ask spread at which liquidity providers (as a whole) are willing to provide liquidity (hereinafter "economic spread").[990]

2. Economics of Minimum Pricing Increments

When a market has a minimum pricing increment (hereafter "tick sizes" or just "ticks"), liquidity providers quote bid and ask prices that are discrete whole number multiples of that tick. For example, if the tick is a penny, then a liquidity provider quotes prices that are a multiple of a penny, such as $10.00 or $10.01, but not $10.015. There may, however, be a liquidity provider willing to quote an ask of $10.015 and a bid of $10.005. Were this liquidity provider to be allowed to do so, the stock would have a spread $0.01 (i.e., the difference between the lowest ask price and bid price). However, in the presence of the $0.01 tick, liquidity providers will quote at

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989 Proposing Release, supra note 11, at 80309 n.483. See also Jonathan Brogaard & Corey Garriott, High-Frequency Trading Competition, 54 J. FIN. & QUANTITATIVE ANALYSIS 1469 (2019) (documenting that as more high-frequency liquidity providers enter the market, spreads decrease until they converge to competitive levels).

990 Although the Proposing Release did not use the phrase "economic spread," the release employed the same concept in multiple places. See, e.g., Proposing Release, supra note 11, at 80317 ("In a competitive market, and in the absence of rebates or other price distortions, the prevailing bid or ask price would be the feasible price equal to just worse than the price that equates liquidity supply and demand."). In a number of places where the release employed the concept of economic spread, it arose in discussions about a stock that would trade at a given price or spread absent the tick size. See Proposing Release, supra note 11, at 80304, 80309, and 80317. The spread is composed of several elements: adverse selection, inventory risk, and processing costs. See Proposing Release, supra note 11, at 80304 n.447 and 80321. See generally, Roger D. Huang & Hans R. Stoll, The Components of the Bid-Ask Spread: A General Approach, 10 REV. FIN. STUD. 995 (Winter 1997). As explained in the Proposing Release, supra note 11, at 80304 and n.447, the spread is unlikely to ever be zero due to inventory costs, adverse selection risks, the direct costs associated with providing liquidity, and trading rules meant to prevent the locking and crossing of markets. See P.C. Kumar, Bid-Ask Spreads in U.S. Equity Markets, 43 Q. J. BUS. & ECON 85 (2004).

the best feasible ask price above $10.015, which is $10.02, and the best feasible bid price below $10.005, which is $10.00.[991] Consequently, the stock's quoted spread would be $0.02 instead of $0.01, twice as wide than it would otherwise be.

Tick sizes present an economic tradeoff. As discussed in the Proposing Release, in determining what tick size is optimal for any given stock, there is a tradeoff between price competition on one hand, and incentives for liquidity provision on the other.[992] A smaller tick allows liquidity providers to better compete on price which can lead to narrower spreads, reducing costs for investors. On the other hand, a smaller tick can also lead to pennying. Pennying increases adverse selection costs for slower liquidity providers by making it more likely that they trade when prices are moving in an unfavorable direction relative to their positions.[993] To compensate for these costs, liquidity providers may post less aggressive quotes—lower bid prices and higher ask prices—resulting in a wider quoted spread and worse

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991 As discussed in the Proposing Release, supra note 11, at 80309 nn.483-484 and accompanying text, this assumes that stock prices are expected to revert to the next worse level. This may occur because standard economic theory suggests that in a competitive market liquidity providers will compete to provide liquidity until the spread – i.e., their compensation for providing liquidity – is equal to the break-even point for liquidity provision. See also Jonathan Brogaard & Corey Garriott, High-Frequency Trading Competition, 54 J. FIN. & QUANTITATIVE ANALYSIS 1469 (2019) (documenting that as more high-frequency liquidity providers enter the market, spreads decrease until they converge to competitive levels). The range of infeasible quoting prices narrows somewhat in the presence of rebates for liquidity providers. section VII.B.3 discusses these effects.

992 Proposing Release, supra note 11, at 80305.

993 Id., at 80305 n.481 and accompanying text.

liquidity. [994] Both price competition and adverse selection from pennying lie on a continuum. [995] As explained in infra section VII.D.1, the degree to which pennying versus price competition dominates in determining whether increasing the tick will improve market quality depends on the relation between the tick and the spread. The greater the tick is in relation to the spread, the greater the effect of price competition, and the lower the risk of pennying. [996] Accordingly, the Commission defines a stock to be tick-constrained if there is a reasonable probability that the stock would otherwise trade with a spread less than the tick size in the course of normal trading, were it allowed to do so, or one for which the tick is a substantial portion of the quoted spread. [997]

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994 Id. at 80305-06. Pennying is defined in the Proposing Release as occurring when a market participant gets to the front of the limit order queue by posting economically trivial price improvement. Id. at 80306 n.459. One commenter also described the economics of pennying using option theory and the Commission agrees with this characterization. See Harris Letter at 6. According to the commenter, pennying results in a payoff structure that has unlimited potential upside while the downside is capped. By pennying, a fast trader jumps to the front of the queue and therefore has a high chance of executing his trade and capturing the upside if prices move favorably. If prices move in an unfavorable direction, the fast trader can unwind his position against the slower liquidity supplier (whom he undercut); in this case, the cost to the fast trader—i.e., the cost of the option—is only one tick. The fast trader thereby captures value from the liquidity supplier and hence discourages slow traders from offering liquidity. A small tick means that the cost of pennying is low, which results in more pennying and thus less incentive for liquidity provision. See also Lawrence E. Harris, Minimum Price Variations, Discrete Bid–Ask Spreads, and Quotation Sizes, 7 REV. FIN. STUD. 149 (1994); Anne Dyhrberg, et al., When Bigger is Better: The Impact of a Tiny Tick Size on Undercutting Behavior, 58 J. FIN. & QUANTITATIVE ANALYSIS (2023) (Dyhrberg et al.).

995 Proposing Release, supra note 11, at 80305 n.458.

996 See infra section VII.D.1.b.i.

997 The Commission's definition of tick-constrained in this release eliminates an unnecessary distinction drawn between tick-constrained and near-tick-constrained stocks that appears in the Proposing Release. Specifically, in the Proposing Release's economic analysis, the Commission stated that it considered the term "tick-constrained" to apply to "stocks that would otherwise trade with a spread less than the tick size, were they allowed to do so." Proposing Release, supra note 11, at 80304. That economic analysis also stated that a "near-tick-constrained" stock was "one that has a reasonable probability of becoming tick-constrained in the course of normal trading, or one for which the tick is a substantial portion of the spread." Id. Given the economics of minimum pricing increments discussed in this section, distinguishing near-tick-constrained stocks from tick-constrained stocks is unnecessary. The Proposing Release's discussion of these terms in its economic analysis did not meaningfully differentiate between the effects on stocks in each of these groups. As a result, applying the singular term tick-constrained avoids confusion and streamlines the discussion. In addition, the Proposing Release's empirical analysis employed separate numerical definitions for tick-constrained and near-tick-constrained stocks. Compare id. at 80268 n.17 (tick-constrained stocks are those with a Time Weighted Average Quoted Spread less than .011) with id. at 80304 n.449 (near-tick-constrained stocks are those with a Time Weighted Average Quoted Spread

That is, while tick constrained stocks are not the only ones to potentially benefit from a reduction in the tick size, they are the ones most clearly likely to do so.[998]

Benefits from a reduction in the tick size come in the form of higher market quality and lower transaction costs to investors. As explained above, relaxing the tick constraint (the price floor on liquidity) directly allows competition for market orders. Moving toward a more competitive market reduces distortions and economic rents.

As a general matter, a liquidity provider is incentivized to get its quote to the front of the queue (*i.e.* establish price/time priority on an order book).[999] This is because stock exchange priority rules give greater priority to better priced orders and generally factor order entry time into the priority of limit orders at the same price. When the NBBO is equal to the tick, liquidity providers cannot establish price priority (other than by crossing the spread) [1000] because there are no price points at which to do so.[1001] Because liquidity providers cannot establish price priority

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between .011 and .02). These numerical definitions served as proxies for drawing distinctions in the Proposing Releases' empirical analysis. See, e.g., id. at 80304 nn.448-449; at 80308 n.473 and accompanying text; and at 80319 n.549. Although we continue to include specific explanations of what stocks are included in each of our quantitative analyses where relevant, to further simplify the discussion in the economic analysis, we do not use the definitions employed in the empirical analysis more broadly.

998 See Proposing Release, supra note 11, at 80309 and the discussion accompanying nn.474-477. See also CCMR Letter at 18 ("an MPI that is too wide may set an artificial constraint on permissible bids and offers, which can result in an unnecessarily wide spread that can also increase transaction costs for investors").

999 Material presented in this paragraph was discussed in the Proposing Release, supra note 11, at 80309 and nn.478–481.

1000 "Crossing the spread" refers to switching from posting a (non-marketable) limit order to sending a market order. For example, if the national best bid were $10.00 and the national best offer were $10.02, a limit order to buy, if executed, would entail paying $10.00 for the security. However, a market order to buy would entail pay $10.02, in other words, it would have crossed the spread of $0.02. In the most common case of maker-taker, the difference between the market and limit order is even greater because the buyer using a market order would pay $10.02 plus the fee, whereas the buyer using a limit order would pay $10.00 minus the rebate.

1001 The liquidity provider could submit an order at an inverted exchange, though this is an inefficient solution. See section VII.C.2.c.

when the NBBO spread is one tick, establishing time priority becomes more important.[1002] Consequently, an environment where stocks are tick-constrained with artificially wider spreads and longer order queues tends to favor traders who are better able to establish positions more quickly so they can be at the front of the queue. Traders who are at the back of the queue face slower executions and the risk of not being executed against at all (a lower fill rate). In the latter case, they will need to resubmit an order when the market has moved in an unfavorable direction, increasing transaction costs. Adverse selection amplifies these costs: the orders of slower traders are most likely to be executed when such an execution is unfavorable to them and least likely when they would be favorable. For example, a sell order at the back of the queue will tend to be filled when there are many buy orders, which tend to increase the price, implying that selling is disadvantageous.

To summarize, current wider quoted spreads mean greater cost to liquidity demanders and greater revenue to liquidity providers.[1003] An artificially wide spread, due to a price floor imposed by the tick constraint, effectively subsidizes liquidity provision. Because there is an

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[1002] Under typical exchange rules, an order with time priority is executed first when multiple orders are at the best price, regardless of how many orders are at the best price. In longer order queues, liquidity-providing orders deeper in the queue, which do not have time priority, are less likely to be filled in a timely manner and, conditional on being filled, the probability of the order having been adversely selected tends to be greater compared to orders with greater fill priority. Typically, liquidity providers compete to gain priority over other resting orders by quoting a better price, but tick-constraints make doing so difficult. In the case when the spread is constrained to a single tick, it would be impossible to improve on the displayed price without locking markets. For tick-constrained stocks, when the quoted spread may be greater than a single tick, improving the price by an entire tick may be too much in the sense that doing so may narrow the spread beyond what the liquidity providers could tolerate. A narrower tick de-emphasizes time priority on a stock exchange by making it easier to compete on price. See Edwin Hu, et al., Tick Size Pilot and Market Quality (DERA White Paper, Jan. 31, 2018), available at https://www.sec.gov/dera/staff-papers/white-papers/dera_wp_tick_size-market_quality; and Todd G. Griffith & Brian S. Roseman, Making Cents of Tick Sizes: The Effect of the 2016 U.S. SEC Tick Size Pilot on Limit Order Book Liquidity, 101 J. BANKING FIN. 104 (2019).

[1003] Market participants can use inverted exchanges or ISOs to help ameliorate some of the negative effects of tick size constraints.

increased incentive to provide liquidity via limit orders, queues of limit orders tend to be longer, and wait times to get a limit order executed also tend to be longer. This makes it more likely that the market moves away from an investor's limit order and leads to lower overall fill rates for limit orders.[1004] Thus the floor on liquidity leads to rents accruing to fast liquidity providers[1005] at the expense of slower ones as well as liquidity demanders.[1006]

3. Economics of Access Fees

Trading venues can choose to charge an access fee, or pay a rebate, to their participants—liquidity providers and liquidity takers—who trade at their venue. The trading venue can further choose to levy the fee (or pay the rebate) on either the liquidity taker or liquidity provider, or on both. As discussed in infra section VII.C.2.b, the most common fee structure is maker-taker, in which liquidity takers are assessed an access fee and liquidity providers are paid a rebate, which is typically funded though the access fee. That is, for a buy order the liquidity taker pays the

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1004 See, e.g., Barbara Rindi & Ingrid M. Werner, U.S. Tick Size Pilot (working paper Mar. 4, 2019), available at https://ssrn.com/abstract=3041644 (retrieved from SSRN Elsevier Database); Mao Ye & Chen Yao, Tick Size Constraints, Market Structure and Liquidity (working paper Dec. 26, 2019), available at https://ssrn.com/abstract=2359000 (retrieved from SSRN Elsevier database); Phil Mackintosh, Why Ticks Matter, NASDAQ (May 19, 2022), available at https://www.nasdaq.com/articles/why-ticks-matter; and MEMX, Tick-Constrained Securities (Aug. 2021) ("MEMX Report"), available at https://memx.com/wp-content/uploads/MEMX-Market-Structure-Report-Tick-Constrained-Securities.pdf.

1005 This phenomenon is sometimes referred to as excessive intermediation. In this context, excessive intermediation refers to excessive quoting in sufficiently liquid securities in order to profit from the tick-constraint-induced price floor on liquidity, which crowds out investors from being able to supply liquidity. Such price floors can increase quoting activity from high-frequency traders looking to earn the artificially high spread. Because profiting off of the spread is easiest when the marketable orders filled are small, obtaining high priority in the queue at each tick is essential to such strategies. High-frequency, proprietary traders are generally better able to obtain such priority, and consequently investors may have less opportunity to profitably fill their trades using limit orders. Rebates on limit orders further increase the incentives of these traders to engage in such intermediation, thereby exacerbating the problem.

1006 In support of this point, one commenter stated that the subsidization of liquidity providers resulting from the tick constraint leads to greater competition on the basis of speed to provide liquidity, which increases complexity and related costs to investors; See Budish Letter at 4.

price plus the access fee. For a sell order, the liquidity taker receives the price, less the fee. Assuming the broker-dealer is the principal to the trade, then the economic price of accessing or providing liquidity would be equivalent to the displayed nominal price net of the applicable fees. If the broker-dealer is an agent, then there may a wedge between economic price of accessing or providing liquidity and the price net of the fee and rebate. It is possible that the fee and rebate may be passed on directly to the customer. The fee and rebate may be passed on indirectly and in part through fees, commissions, or as part of a bundle of services to the customer.

Section VII.C.2 describes the current market structure as it relates to access fees and rebates. A key feature of the current market structure is that many exchanges charge at the current cap and pay out nearly all of the fee as a rebate. For this reason, in practice the Commission expects access fees to be near the cap under the amended rule, just as they are near the pre-existing cap under the current structure. As discussed in the Proposing release, several basic economic considerations are among those governing the analysis of access fees. First, access fees should be such that net and quoted prices satisfy coherence.[1007] Second, under simplifying assumptions, fees and rebates are approximately neutral provided that the stock is not tick constrained,[1008] although outside of those simplifying assumptions lowering the access fee cap can have additional benefits as discussed in section VII.D.2.d. Finally, for tick constrained stocks, access fees and rebates can distort liquidity supply and demand, increasing transaction costs for investors.[1009]

1007 See Proposing Release, supra note 11, at 80348 ("Net and nominal price rankings are coherent if sorting trading venues on the competitiveness of their nominal quoted prices yields the same ordering as sorting on prices net of fees and rebates.").

1008 Proposing Release, supra note 11, at 80328.

1009 Id.

In response to the Proposing Release, the Commission received extensive comment regarding the role of fees and rebates on the supply of and demand for liquidity.[1010] Below, to address comments, the Commission supplements its discussion on how access fees and fee-funded rebates may affect trading in the presence of the commonly used maker-taker fee structure. [1011] This section addresses certain aspects of fees and rebates in developing a basic framework for evaluating the principle economic effects and responding to comments. The remaining aspects and effects are considered in sections VII.C.2, VII.D.2, and VII.D.3.

a. Liquidity with Access Fees and Rebates

In the absence of ticks, the market for liquidity, discussed in section VII.B.1, may generally be represented by an economic model of supply and demand, as shown below in Panel A of Figure 1.[1012] The vertical axis represents the price of liquidity, here the quoted half-spread

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1010 Specifically, commenters had different views on whether reducing access fees and rebates will adversely affect the provision of liquidity on exchanges, either generally or for particular categories of stocks. Compare Cboe Letter II at 9; Cboe Letter III at 6, 8; Cboe Letter IV at 3, 5; CCMR Letter at 27; IEX Letter I at 2; IEX Letter IV at 18, 21; IEX Letter V at 4; IEX Letter VI at 7; Nasdaq Letter I at 2, 20, 22, 25; Nasdaq Letter II at 3, 6; Nasdaq Letter III at 2-3; Themis Letter at 7-8; Virtu Letter II at 7-8. Commenters likewise had differing perspectives on whether reducing access fees and rebates will reduce overall transaction costs, thereby increasing demand for liquidity, or cause offsetting costs related to, e.g., wider spreads, volatility, or a less representative NBBO (which could reduce demand for liquidity). Compare Cboe Letter III at 5-6; Cboe Letter IV at 5; CCMR Letter at 27; IEX Letter I at 26; IEX Letter IV at 16, 22-23; Nasdaq Letter I at 2, 20, 22-24; Nasdaq Letter II at 4-7; Nasdaq Letter III at 5; Themis Letter at 7; Virtu Letter II at 8. As one example of this debate, Nasdaq identifies a "vicious cycle" that could result from a reduction in the minimum access fee, whereas IEX identifies a "virtuous cycle" from the identical change. See Nasdaq Letter II at 6; IEX Letter I at 26. See section VII.D.2 for a response to these comments on the effect of the reduction in the access fee cap on liquidity and transaction costs.

1011 The economic theory laid out below allows the Commission to create a common framework for the competing claims of commenters and to disentangle the complex forces at work in determining spreads. While the Commission has supplemented this discussion from the Proposing Release, the essential point in this framework—the equilibrium resulting from the supply and demand for liquidity, modified as necessary for the presence of a minimum tick—was discussed throughout the Proposing Release. See, e.g., Proposing Release, supra note 11, at 80228-29, 80317, 80321, 80336, 80338.

1012 This model presents an abstraction of the market for liquidity. As explained in section VII.B.2, the willingness to quote a bid or offer depends in part on the degree of adverse selection in the market which in turn depends on the tick size. The key point in this section is that, for stocks that have a spread that is sufficiently wide, liquidity providers are indifferent between receiving compensation in the form of spread

(*i.e.* because the liquidity taker is not typically on both sides of the trade, we use the quoted half-spread to measure price of liquidity[1013]), while the horizontal axis represents the quantity of liquidity.[1014] Liquidity providers supply liquidity, and the supply curve is upward sloping because liquidity providers are willing to supply more liquidity when the price of liquidity is higher. Liquidity takers demand liquidity, and the demand curve is downward sloping because liquidity takers demand less liquidity at higher prices of liquidity (*i.e.,* they trade less when they have to pay higher transaction costs). The supply and demand curves intersect at the point where the amount of liquidity supplied equals the quantity demanded, which indicates the equilibrium price and quantity of liquidity in the market.

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or in the form of a rebate; similarly, liquidity demanders are indifferent between paying the spread or access fee, and thus fees and rebates tend to be neutral assuming a spread that is sufficiently wide. This point is unaffected by the presence of adverse selection arising from a tick that may be too narrow.

[1013] The price of liquidity is represented by the quoted half-spread because the half-spread represents the price which liquidity takers must pay for the immediacy of executing their trade while liquidity providers stand to capture the half-spread.

[1014] Figure 1 shows the supply and demand for liquidity, with the quoted half-spread as representing the price of liquidity on the y-axis. This should not be confused with supply and demand for shares of the stock, where the price of the stock would be on the y-axis.

Figure 1

Panel A ***Panel B***

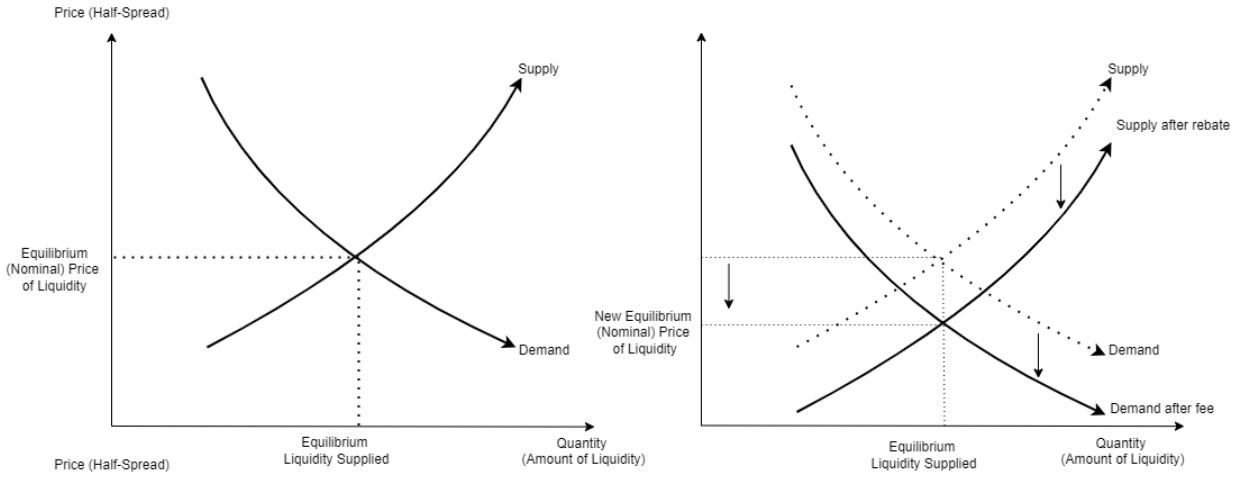


Figure 1: The above figures illustrate the market for liquidity represented by a supply curve and a demand curve. Liquidity suppliers contribute to the supply of liquidity by posting passive orders such as limit orders, while liquidity demanders trade against the passive orders thereby taking liquidity. All other things equal, the quantity of liquidity supplied increases as the price of liquidity increases, while the quantity of liquidity demanded decreases as the price of liquidity increases. The price of liquidity is represented by the quoted half-spread because the half-spread represents the price which liquidity takers must pay for the immediacy of executing their trade while liquidity providers stand to capture the half-spread. The intersection of these curves sets the equilibrium price of liquidity (i.e., the half-spread) and the equilibrium quantity of liquidity. As demonstrated in the supply-demand diagram on the right, rebates shift the supply curve so that there is more supply for a given quoted price of liquidity. Fees increase the cost of demanding liquidity so the shift in the demand curve reflects that there will be less demand at any given price of liquidity. Because both supply and demand curves vertical shifts are parallel, they continue to intersect at the same value along the horizontal axis (the amount of liquidity supplied/demanded).

Consider next the effect on liquidity of a 30 mils access fee used to fund a 30 mils rebate.[1015] With a rebate of 30 mils, liquidity providers who submit buy orders are willing to increase their bid price by 30 mils, while liquidity providers who submit sell orders are willing to lower their ask price by 30 mils. For this reason, the bid-ask spread narrows by 60 mils, and the quoted half-spread (*i.e.,* price of liquidity) narrows by 30 mils. Accordingly, in Panel B of Figure

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1015 This level of access fee and rebate is similar to current fees and rebates on maker-taker lit exchanges and may vary based on pricing tier; see infra section VII.C.2.b. To illustrate the salient economic points, this discussion assumes that liquidity providers and demanders know what the resulting access fees and rebates from a transaction will be. As discussed below in sections VII.C.2.b and VII.D.3, in the baseline this is only ever approximatively true since fees and rebates are often determined using current and future volumes. But as long as market participants are able to approximate their fees and rebates, then they will generally behave as described in this paragraph—liquidity providers will adjust their quotes on account of the expected rebate, and liquidity demanders will adjust the quoted price they are willing to pay on account of the expected fee.

1, the supply curve for liquidity shifts down by 30 mils. Likewise, the 30 mils access fee acts as a tax on liquidity takers. This means that, for the same amount of liquidity, liquidity takers will reduce the price they are willing to pay by 30 mils to account for the access fee (since their net cost to take liquidity is the price they pay plus the access fee). In Panel B of Figure 1, this effect is represented by the liquidity demand curve shifting down by 30 mils. Because both the supply curve and the demand curve shift down by 30 mils, they continue to intersect at the same quantity of liquidity.[1016] That is, the equilibrium amount of liquidity remains unchanged, but the displayed price is 30 mils lower. The net cost to take liquidity is not affected since it equals the price of liquidity plus the 30 mils access fee; [1017] similarly, the net proceeds from providing liquidity are not affected since they equal the price of liquidity plus the 30 mils rebate.[1018] Thus, in the absence of frictions (*e.g.*, discrete prices, minimum pricing increments, or agency problems), the level of fees and rebates (when fees and rebates are equal in size) does not affect the total costs of trading.[1019] As one commenter put it, "when liquidity suppliers are subsidized at the cost of liquidity takers, spreads decline. If they did not, everyone would want to be a liquidity

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[1016] If the demand curve were vertical (namely if liquidity demanders were not sensitive to price), the curve would not shift. However, the conclusions would be the same in that the supply curve shift would cause the same quantity to be supplied at a lower price.

[1017] The concept that net cost (or net spread) is the correct way to measure the cost of liquidity is supported by basic economics and by commenter statements. See Citigroup Letter at 6 (stating, "Many of CGMI's institutional clients are increasingly measuring their execution costs all-in, inclusive of exchange fees.").

[1018] This discussion refers to the cost to take liquidity and proceeds from providing liquidity at the time of the execution of the trade.

[1019] The term frictions here refers to factors that prevent prices from perfectly reflecting the forces of liquidity supply and demand. It does not imply that a frictionless market is the optimal market construct. As discussed throughout this release, a tick size that is too small creates pennying concerns which can harm market quality outcomes. See infra section VII.D.1.b for additional discussion.

supplier, and no trade would occur. So, maker-taker pricing created narrower quoted spreads on average, but it does not affect the net cost of providing liquidity."[1020]

Academic work on the effect of a fee change on the Toronto Stock Exchange supports the model.[1021] In 2005, the exchange began offering a rebate to liquidity suppliers in a pre-defined subset of securities. For securities in which the total fee remained constant but was split into a maker rebate and a taker fee, the authors find that quoted spreads narrow, but the net spread—which includes the quoted spread and the take fee—did not change.[1022]

b. Liquidity with Ticks, Access Fees, and Rebates

Section VII.B.3.a shows that the quoted spread adjusts to a fee and rebate by narrowing by the amount of the fee and the rebate. The supply and demand curves in section VII.B.3.a are continuous, whereas in fact displayed liquidity has discrete price points, namely ticks (the focus of section VII.B.2). In the presence of ticks, access fees and rebates need no longer be neutral, namely the quoted spread may not adjust in the same seamless way to the presence of a rebate. The basic intuition of section VII.B.3.a states that a liquidity provider is indifferent between receiving compensation from the spread and compensation from the rebate. If a rebate is offered, the liquidity provider in a competitive market responds by accepting a lower spread. However, if the quoted spread is already at its floor, as specified by the tick, it is not possible to further lower

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1020 Harris Letter at 2-3, describing the equilibrium spreads model (citing Kalman J. Cohen, et al., Transaction Costs, Order Placement Strategy and Existence of the Bid-Ask Spread, 89 J. POL. ECON. 287 (1981)).

1021 See Katya Malinova & Andreas Park, Subsidizing Liquidity: The Impact of Make/Take Fees on Market Quality, 70 J. FIN. 509 (2015).

1022 The authors also present evidence suggesting that adverse selection costs decreased with the introduction of the maker-taker model by increasing retail trader participation. See Malinova and Park (2015), supra note 1021. In the United States, most retail orders in NMS stocks are handled by wholesalers, who execute a large majority of the dollar volume of the retail orders they handle via internalization. See, e.g., Lewis Letter attached to Virtu Letter II at p 8-12 and 40-45. Consequently, should there be a decrease in retail participation, we do not expect this to cause an increase in adverse selection on exchanges, because so much of retail order flow passes through a wholesaler before being executed.

the spread. In this case, unlike in section VII.B.3.a, the rebate and access fee are therefore not neutral. Rather, the floor creates rents that in this case accrue to those liquidity suppliers that are able to get to the front of the queue the fastest. These rents are earned at the expense of liquidity takers and slower liquidity providers.[1023]

For stocks that are not constrained by the tick, rebates and access fees are again on average neutral, as we now show. Consider, for example, a stock with an economic spread of 2 cents. Absent a fee or rebate, the quoted spread would equal the economic spread rounded up to the next smallest tick, or this case, also 2 cents.[1024] Given a 30 mil rebate, a liquidity provider would be willing to quote a spread of 1.4 cents (the economic spread of 2 cents minus twice the 0.3 cents rebate, or 1.4 cents). However, given the tick, it is likely that the quoted spread would be a full 2 cents. If it were any lower, the profit-maximizing liquidity provider would incur a marginal cost (the economic spread of 2 cents) that exceeds the marginal benefit (i.e., the next smaller quoted spread of 1 cent plus twice the 0.3 cent rebate, or 1.6 cents). It is unlikely that the liquidity provider would be willing to do this.[1025] Now, consider the perspective of the market participant taking liquidity. Because the liquidity taker is not typically on both sides of the trade, we use the half-spread to measure their costs due to the bid-ask spread.[1026] This liquidity taker pays the half-spread along with the access fee. In this case, the half-spread is 1 cent and the access fee is 0.3 cents, so the total is 1.3 cents. As stated above, in the absence of rebates, the

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1023 See Budish Letter and Harris Letter; see also supra notes 999 to 1008, and surrounding discussion.

1024 This stock may become tick-constrained in the future, and indeed some stocks that have an average spread of 2 cents over a prior period could be tick-constrained during that time.

1025 Equivalently, the liquidity provider is only willing to quote at 1.4 cents or above, and therefore the quoted spread must be at least 2 cents.

1026 See section VII.B.3.a.

quoted spread would equal its economic spread of 2 cents. The half-spread would be 1 cent, less than 1.3 cents, meaning that the liquidity taker pays more when there are fees and rebates.

However, consider a stock with an economic spread of 2.5 cents. Given a 30 mil rebate, a liquidity provider would be willing to quote a spread of 1.9 cents (the economic spread of 2.5 cents minus twice the 0.3 cents rebate, or 1.9 cents). Again, given the tick, it is likely that the quoted spread would be a full 2 cents. The liquidity taker would again pay 1.3 cents. In this case, in the absence of rebates, it is likely that the quoted spread would be 3 cents. Otherwise, the profit-maximizing liquidity provider would incur a marginal cost (the economic spread of 2.5 cents) that exceeds the marginal benefit (i.e., the next smallest quoted spread of 2 cents). Given that the quoted spread is 3 cents, the quoted half-spread would be 1.5 cents, so the liquidity taker would likely pay more if there were no fees and rebates.

This same reasoning can be used to show that, except for stocks for which the economic spread is one cent or below, the effect of fees and rebates cancels out mathematically.[1027] The main intuition is that, while liquidity providers will quote one tick lower if the rebate pushes the spread below the next smaller tick, liquidity demanders pay the access fee even if the rebate does not change the quoted spread. We show that the gains to liquidity demanders from this situation are exactly offset by their losses when the rebate does not result in quoting one tick lower, all provided that the economic spread is greater than one cent. Thus, the supply-demand curve

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[1027] Let S^* equal the economic spread, R the rebate, and t the tick size. Then, for any integer $N \geq 1$, the liquidity provider collects $t - 2R$ more in profits under no rebates versus rebates when $S^* \in (tN, tN + 2R]$, and $2R$ less in profits when $S^* \in (tN + 2R, tN + t]$. These amounts sum to zero assuming a uniform distribution over the interval. The liquidity taker is on the other side of the trade; in total, the profits to providers are losses to takers, and so these also sum to zero. In contrast, for $N < 1$, the liquidity provider collects profits $2R$ over the interval $(0, t]$, The assumption of a uniform distribution over the interval is not necessary for the result. It is a reasonable and standard assumption given the lack of specific information on the properties of S^* over intervals of length equal to the tick size.

reasoning in section VII.B.3.a is robust to the introduction of the tick, provided that the economic spread is greater than 1 tick. In other words, for stocks for which the economic spread exceeds 1 tick, fees and rebates are neutral on average.

One commenter provides a numerical example that might appear to go against this neutrality result. In particular, the commenter states that, "because rebates also increase depth, it is possible that the costs of access fees for liquidity takers are more than offset by the tighter spreads and depth that they create."[1028] The numerical example is as follows: A liquidity taker wants to buy 1,000 shares, and the tick size is 1 cent. Without access fees and rebates, the liquidity provider is willing to sell 651 shares at a price of $10.02 and 349 shares at a price of $10.03, in which instance the liquidity provider earns $10.02349 per share.[1029] The liquidity taker then pays an average of $10.02349 per share to buy the 1,000 shares.[1030] In the presence of an access fee and rebate of 30 mils per share (i.e., $0.003 per share), the commenter states that the liquidity provider is willing to sell all 1,000 shares at $10.02, in which instance the liquidity provider earns only $10.023 per share (i.e., $10.02 per share + $0.003 rebate per share = $10.023 per share). The liquidity taker thus pays only $10.023 per share to buy the 1,000 shares in the presence of an access fee and rebate of 30 mils (i.e., $10.02 per share + $0.003 access fee per share = $10.023 per share).

However, it is not clear from the example why the liquidity provider would be willing to offer all of the 1,000 shares at $10.02 per share and earn only $10.023 per share in the presence

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1028 See Nasdaq Letter I at 23.

1029 In the commenter's example, prices account for the presence of a 1 cent tick. This explains why the liquidity provider is offering shares at $10.02 and $10.03 and not at prices in between. The liquidity provider earns: ($10.02 * 651 + $10.03 * 349) / 1,000 = $10.02349 per share to sell 1,000 shares.

1030 ($10.02 * 651 + $10.03 * 349) / 1,000 = $10.02349 per share to buy 1,000 shares.

of the rebate when it earned $10.02349 per share absent the rebate. Rather, in the presence of the rebate, the liquidity provider would be willing to sell 951 shares at $10.02 and 49 shares at $10.03, in which instance it would also earn $10.02349 per share on average.[1031] Depth does increase, as the commenter states. However, consistent with the neutrality argument, the liquidity taker pays exactly the same as without the fees and rebates. Thus, while tighter spreads offset the cost of access fees, they do not "more than offset" these fees.[1032]

The previous argument for neutrality pertained to stocks for which the economic spread was greater than one tick. For stocks for which the economic spread is less than 1 tick, however, fees and rebates are not neutral. Rather, because the quoted spread cannot fall to compensate for the rebate, provision of liquidity is overpriced at the spread of one tick. Because the price is artificially high, the supply of liquidity is distorted,[1033] leading to rents for liquidity providers who can get to the top of the queue the fastest. It is harder as a result for slower liquidity providers, such as retail investors and institutions to have their limit orders executed. It is also more expensive for investors seeking to access liquidity. For these stocks, lowering the access fees lowers rents and improves market quality, making it cheaper to transact for investors as a whole.

C. Baseline

The baseline against which the costs, benefits, and the effects on efficiency, competition, and capital formation of the amendments are measured consists of the current state of the trading

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1031 (951 * $10.02 + 49 * $10.03) / 1,000 + $0.003 = $10.02349 per share, where $0.003 is the rebate per share.

1032 See section VII.E.3 for discussion of the commenter's concerns regarding capital formation as it relates to reduced depth at the NBBO.

1033 Proposing Release, supra note 11, at 80328-29.

environment for NMS stocks, including pricing increments; current practice as it relates to order routing, quotes, fees, and rebates; and availability of data about quotes, fees, and rebates; and the current regulatory framework. The economic analysis appropriately considers existing regulatory requirements, including recently adopted rules, as part of its economic baseline against which the costs and benefits of the amendments are measured.[1034]

Several commenters requested that the Commission consider interactions between the economic effects of the proposed rule and other recent Commission rules.[1035] Since the date of the Proposing Release, the Commission has adopted eight rules mentioned by commenters,[1036] namely the Settlement Cycle Adopting Release,[1037] the February 2024 Form PF Adopting

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1034 See, e.g., Nasdaq v. SEC, 34 F.4th 1105, 1111–15 (D.C. Cir. 2022). This approach also follows Commission staff guidance on economic analysis for rulemaking. See Current Guidance on Economic Analysis in SEC Rulemaking, (Mar. 16, 2012), available at https://www.sec.gov/divisions/riskfin/rsfi_guidance_econ_analy_secrulemaking.pdf ("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."); id. at 7 ("The baseline includes both the economic attributes of the relevant market and the existing regulatory structure."). The best assessment of how the world would look in the absence of the proposed or final action typically does not include recently proposed actions, because that would improperly assume the adoption of those proposed actions.

1035 See, e.g., CCMR Letter; Independent Trustees Letter; SIFMA Letter I; Citadel Letter I; Equity Market Structure Citadel Letter; ICAN Letter; Virtu Letter II; AIC Letter; AIMA Letter; Antitrust Division of the DOJ Letter; Wagner Letter; Danny Mulson Letter. See also supra notes 135 to 137, and surrounding text, discussing these comments. Many commenters referred to the "Equity Market Structure Proposals" as a group, and we understand that commenters intended this to mean the four rulemaking proposals the Commission issued on Dec. 14, 2022. Of those four, only one was adopted prior to these amendments. One commenter described "Interconnected Rules" to include those four proposed rules issued on Dec. 14, 2023, as well as certain rules that were previously or later adopted, see infra notes 1036 to 1046; and a variety of other proposed rules including Safeguarding Advisory Client Assets, Investment Advisers Act of 1940 Release No. 6384 (Aug. 23, 2023), 88 FR 14,672 (Mar. 9, 2023). See AIC Letter at 1 n.3, 9 n.30 (listing rules and proposed rules, but not explaining a specific connection to the Proposing Release).

1036 In addition, commenters also mentioned the proposal that was ultimately adopted as Private Fund Advisers; Documentation of Registered Investment Adviser Compliance Reviews, Advisers Act Release No. 6383 (Aug. 23, 2023), 88 FR 63206 (Sept. 14, 2023) ("Private Fund Advisers Adopting Release"). On June 5, 2024, the Fifth Circuit issued a ruling that vacated the rules and amendments adopted in the Private Fund Advisers Adopting Release. Nat'l Ass'n of Priv. Fund Managers v. SEC, 103 F.4th 1097 (2024).

1037 Shortening the Securities Transaction Settlement Cycle, Securities Exchange Act Release No. 96930 (Feb. 15, 2023), 88 FR 13872 (Mar. 6, 2023) ("Settlement Cycle Adopting Release"). The rules and rule amendments adopted in the Settlement Cycle Adopting Release shorten the standard settlement cycle for

Release,[1038] the May 2023 SEC Form PF Adopting Release,[1039] the Dealer Adopting Release,[1040] the Beneficial Ownership Adopting Release,[1041] Rule 10c-1a Adopting Release,[1042] the Short

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most broker-dealer transactions from two business days after the trade date to one business day after the trade date. To facilitate an orderly transition to a shorter settlement cycle, a new rule also establishes requirements related to completing allocations, confirmations, and affirmations no later than the end of trade date for the processing of institutional transactions subject to the rule; requires registered investment advisers to make and keep records of each confirmation received, and of any allocation and each affirmation sent or received, with a date and time stamp for each allocation and affirmation indicating when it was sent or received; and requires clearing agencies that provide a central matching service to establish, implement, and enforce policies and procedures reasonably designed to facilitate straight-through processing and to file an annual report regarding progress with respect to straight-through processing. With certain exceptions, the rule has a compliance date of May 28, 2024. See Settlement Cycle Adopting Release, section VII.

1038 Form PF: Reporting Requirements for All Filers and Large Hedge Fund Advisers, Advisers Act Release No. 6546 (Feb. 8, 2024), 89 FR 17984 (Mar. 12, 2024) ("February 2024 Form PF Adopting Release"). The Form PF amendments are designed to enhance the Financial Stability Oversight Council's ability to monitor systemic risk as well as bolster the SEC's regulatory oversight of private fund advisers and investor protection efforts. The compliance date for the rule is Mar. 12, 2025. February 2024 Form PF Adopting Release, section II.F.

1039 Form PF; Event Reporting for Large Hedge Fund Advisers and Private Equity Fund Advisers; Requirements for Large Private Equity Fund Adviser Reporting, Investment Company Act of 1940 Release No. 6297 (May 3, 2023), 88 FR 38146 (June 12, 2023) ("May 2023 SEC Form PF Adopting Release"). The Form PF amendments adopted in May 2023 require large hedge fund advisers and all private equity fund advisers to file reports upon the occurrence of certain reporting events. The compliance dates were Dec. 11, 2023, for the event reports in Form PF sections 5 and 6, and June 11, 2024, for the remainder of the Form PF amendments in the May 2023 SEC Form PF Adopting Release. See May 2023 SEC Form PF Adopting Release, section II.E.

1040 Further Definition of "As a Part of a Regular Business" in the Definition of Dealer and Government Securities Dealer in Connection with Certain Liquidity Providers, Securities Exchange Act Release No. 34-99477 (Feb. 6, 2024), 89 FR 14938 (Feb. 29, 2024) ("Dealer Adopting Release"). New Rules 3a5-4 and 3a44-2 further define the phrase "as a part of a regular business" as used in the statutory definitions of "dealer" and "government securities dealer." The compliance date is Apr. 29, 2025, for persons engaging in activities that meet the qualitative factors under the final rules. See Dealer Definition Adopting Release, section II.B.

1041 Modernization of Beneficial Ownership Reporting, Securities Act of 1933 Release No. 11253 (Oct. 10, 2023), 88 FR 76896 (Nov. 7, 2023) ("Beneficial Ownership Adopting Release"). Among other things, the amendments generally shorten the filing deadlines for initial and amended beneficial ownership reports filed on Schedules 13D and 13G, and require that Schedule 13D and 13G filings be made using a structured, machine-readable data language. The amendments are effective Feb. 5, 2024. The new filing deadline for Schedule 13G will not be required before Sept. 30, 2024, and the rule's structured data requirements will not be required until Dec. 18, 2024. Beneficial Ownership Adopting Release, section II.G.

1042 Reporting of Securities Loans, Securities Exchange Act Release No. 98737 (Oct. 13, 2023), 88 FR 75644 (Nov. 3, 2023) ("Rule 10c-1a Adopting Release"). This rule requires any covered person who agrees to a covered securities loan on behalf of itself or another person to report specified information about the covered securities loan to a registered national securities association (currently FINRA is the only registered national securities association)—or rely on a reporting agent to do so—and requires the

Position Reporting Adopting Release,[1043] and the Rule 605 Amendments.[1044] The Commission has also considered the potential effects on entities that are implementing other recently adopted rules during the compliance period for these amendments, including the Treasury Clearing

registered national securities association to make certain information it receives available to the public. Covered persons will include market intermediaries, securities lenders, and broker-dealers, while reporting agents include certain brokers, dealers, or registered clearing agencies. The rule's compliance dates require that the registered national securities association propose rules pursuant to Rule 10c-1a(f) by May 2, 2024, and the proposed rules shall be effective no later than Jan. 2, 2025; that covered persons report Rule 10c-1a information to a registered national securities association on or by Jan. 2, 2026 (which requires that the registered national securities association have implemented data retention and availability requirements for reporting); and that the registered national securities association publicly report Rule 10c-1a information by Apr. 2, 2026. Rule 10c-1a Adopting Release, section VIII.

1043 Short Position and Short Activity Reporting by Institutional Investment Managers, Securities Exchange Act Release No. 98738 (Oct. 13, 2023), 88 FR 75100 (Nov. 1, 2023) ("Short Position Reporting Adopting Release"). Under the new rule, institutional investment managers that meet or exceed certain specified reporting thresholds are required to report, on a monthly basis using the related form, specified short position data and short activity data for equity securities. The compliance date is Jan. 2, 2025. See Short Position Reporting Adopting Release, section VI. In addition, the Commission adopted an amendment to the national market system ("NMS") plan governing the consolidated audit trail ("CAT") created pursuant to the Exchange Act to require the reporting of reliance on the bona fide market making exception in the Commission's short sale rules. The Commission published the text of the amendment to the NMS plan governing the CAT ("CAT NMS Plan") in a separate notice. The compliance date for the amendment to the CAT NMS Plan is July 1, 2025. See SEC, Notice of the Text of the Amendment to the National Market System Plan Governing the Consolidated Audit Trail for Purposes of Short Sale-Related Data Collection, Securities Exchange Act Release No. 98739 (Oct. 13, 2023), 88 FR 75079 (Nov. 1, 2023).

1044 Rule 605 Amendments, supra note 10. The Commission adopted amendments to rules requiring disclosures for order executions in NMS stocks, including expanding the scope of reporting entities, modifying the scope of orders covered by the rule, and modifying the information required to be reported under the rule. The rule has an effective date of June 14, 2024, and, with a few exceptions, a compliance date of Dec. 14, 2025. See Rule 605 Amendments, section VII.

Adopting Release[1045] and the Customer Notification Adopting Release.[1046] These recently adopted rules were not included as part of the baseline in the Proposing Release because they were not yet adopted at that time, but they are part of the baseline in this analysis.[1047] In response to commenters, this economic analysis considers potential economic effects arising from any

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1045 Standards for Covered Clearing Agencies for U.S. Treasury Securities and Application of the Broker-Dealer Customer Protection Rule with Respect to U.S. Treasury Securities, Securities Exchange Act Release No. 99149 (Dec. 13, 2023), 89 FR 2714 (Jan. 16, 2024) ("Treasury Clearing Adopting Release"). Among other things, the amendments require covered clearing agencies for U.S. Treasury securities to have written policies and procedures reasonably designed to require that every direct participant of the covered clearing agency submit for clearance and settlement all eligible secondary market transactions in U.S. Treasury securities to which it is a counterparty. The compliance date was Mar. 18, 2024, for covered clearing agencies to file any proposed rule changes pursuant to Rules 17Ad-22(e)(6)(i), 17Ad-22(e)(18)(iv)(C), and 15c3-3, which must be effective by Mar. 31, 2025. With respect to the changes to Rule 17Ad-22(e)(18)(iv)(A) and (B), (i) covered clearing agencies were required to file any proposed rule changes regarding those amendments no later than June 14, 2024, and (ii) those changes must be effective by Dec. 31, 2025, for cash market transactions encompassed by section (ii) of the definition of an eligible secondary market transaction, and by June 30, 2026, for repo transactions encompassed by section (i) of the definition of eligible secondary market transactions. Finally, the Commission amended the broker-dealer customer protection rule to permit margin required and on deposit with covered clearing agencies for U.S. Treasury securities to be included as a debit in the reserve formulas for accounts of customers and proprietary accounts of broker-dealers, subject to certain conditions. Compliance by the direct participants of a U.S. Treasury securities covered clearing agency with the requirement to clear eligible secondary market transactions is not required until Dec. 31, 2025, and June 30, 2026, respectively, for cash and repo transactions. See Treasury Clearing Adopting Release, section III.

1046 Regulation S-P: Privacy of Consumer Financial Information and Safeguarding Customer Information, Securities Exchange Act Release No. 100155 (May 15, 2024), 89 FR 47688 (June 3, 2024) ("Customer Notification Adopting Release"). The Commission amended Regulation S-P to require brokers, dealers, investment companies, registered investment advisers, and transfer agents registered with the Commission or another appropriate regulatory agency to adopt written policies and procedures for incident response programs to address unauthorized access to or use of customer information. These must include procedures for providing timely notification to individuals affected by an incident involving sensitive customer information with details about the incident and information designed to help affected individuals respond appropriately. Among other things, the amendments also broadened the scope of information covered by the safeguards rule and the disposal rule, and extended the requirements to safeguard customer records and information to all transfer agents. The compliance date for larger entities is Dec. 3, 2025, and for smaller entities, June 3, 2026. Customer Notification Adopting Release, section II.F.

1047 Some commenters assumed that the four proposed rules issued on Dec. 14, 2022, would be implemented simultaneously, and therefore stated that the baseline in the Proposing Release was inaccurate to the extent it did not contemplate that the other rules have gone into effect. See, e.g., Equity Market Structure Citadel Letter at 15. As discussed above, however, our baseline does not assume the adoption of proposed rules. Instead, the baseline changes incrementally with each adopted rule. To the extent those or other proposals are adopted in the future, the baseline in those subsequent rulemakings will reflect the existing regulatory requirements at that time.

overlap in compliance dates between these amendments and the other recent amendments.[1048] It also considers interactions between these amendments and the Rule 605 Amendments.[1049]

1. Tick Sizes

Preexisting Rule 612 of Regulation NMS restricts the ability of venues to display, rank, or accept quotations in NMS stocks beyond a certain minimum quoting increment (or tick). This section discusses current regulation on tick sizes and Commission analysis showing that the current tick size acts as a binding price floor on the quoted spread a significant portion of the time for a large fraction of the share volume transacted in NMS stocks.

a. Current Regulations

Preexisting Rule 612 of Regulation NMS, which came into effect on August 29, 2005, prohibited a national securities exchange, national securities association, ATS, vendor, or broker or dealer from displaying, ranking, or accepting quotations, orders, or indications of interest in any NMS stock priced in an increment smaller than $0.01 if the quotation, order, or indication of interest is priced equal to or greater than $1.00 per share. If the quotation, order, or indication of interest is priced less than $1.00 per share, the minimum pricing increment is $0.0001. Most listing exchanges require stocks listed on their exchanges to maintain a price greater than $1.00 per share, and consequently $0.01 is the prevailing tick size for most quotes and orders for NMS

1048 See infra section VII.D.6.b.

1049 See, e.g., SIFMA Letter II (stating that variable tick sizes could diminish the ability to compare execution quality using the Rule 605 disclosures); Citadel Letter II (stating execution quality statistics are important to understanding the effects of these amendments on market quality); AIMA Letter (suggesting finalization of the proposed Rule 605 amendments would, along with the MDI round lot order definition, provide a much more informed economic baseline against which to assess other equity market structure proposals); see also infra section VII.D.6.a, discussing this topic.

stocks.[1050] Preexisting Rule 612 of Regulation NMS effectively establishes $0.01 as the minimum spread that can be quoted for stocks priced equal to, or greater than, $1.00 per share because the NBBO is determined by the best displayed round lot quotes, and exchanges are required to have rules in place to avoid and reconcile locked and crossed quotations.[1051]

While preexisting Rule 612 of Regulation NMS restricts quoting or submitting orders in sub-penny increments for NMS stocks priced greater than or equal to $1.00, it does not restrict trading in sub-penny increments. Sub-penny trading on exchanges and ATSs occurs primarily as a result of midpoint orders and benchmark trades. Benchmark trades, such as volume weighted average price ("VWAP") and time weighted average price ("TWAP") orders, may not be explicitly priced in an impermissible sub-penny increment, but the ultimately determined execution price may be in a sub-penny increment. Trading at sub-penny increments also occurs as a result of broker-dealers, including some OTC market makers known as wholesalers, internalizing customer order flow at sub-penny prices.[1052]

Sub-penny trading on registered exchanges may also occur as a result of their RLPs. The Commission granted exemptions from Rule 612 to various national securities exchanges' RLPs as a means to allow them to compete with OTC sub-penny price improvement.[1053] Under the

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1050 See, e.g., NYSE Continued Listing Standards, § 802.01C, available at https://www.nyse.com/listings/resources; Rulebook - The Nasdaq Stock Market, §5400, available at https://listingcenter.nasdaq.com/rulebook/nasdaq/rules.

1051 See Reg NMS Rule 610(d). A locked market occurs when the bid and ask price for a security are identical. A crossed market occurs when the bid is higher than the ask.

1052 The term "wholesaler" is not defined in Regulation NMS, but commonly refers to a broker-dealer acting as an OTC market maker that primarily focuses on attracting orders from broker-dealers that service the accounts of a large number of individual investors, referred to in this release as "retail brokers."

1053 See Securities Exchange Act Release No. 67347 (July 3, 2012), 77 FR 40673 (July 10, 2012) (approving retail liquidity programs on a pilot basis for NYSE and NYSE Amex and granting rule 612 exemption) ("NYSE Retail Liquidity Program Approval Order"); see also CBOE BYX Rule 11.24; Securities Exchange Act Release No. 68303 (Nov. 27, 2012), 77 FR 71652 (Dec. 3, 2012) (CBOE BYX Retail Pilot

RLPs, exchanges can accept and rank certain quotes and orders from certain participants in sub-penny increments as small as $0.001.[1054] The national securities exchanges designed the RLPs to attract retail orders by providing a potential for price improvement at sub-penny levels because "most marketable retail order flow is executed in the OTC markets, pursuant to bilateral agreements, without ever reaching a public exchange" and OTC market makers typically pay retail brokers for their order flow.[1055] Quotes in RLP programs are not displayed. Instead, the appropriate SIP disseminates a flag indicating the side of the market for which an exchange has an RLP quote available at a price better than the NBBO. Because the exclusive SIP does not make known the price or the size of the RLP quote, market participants do not see the full liquidity available in RLP programs.[1056] To date, RLPs have not attracted a significant volume of retail order flow.[1057]

One commenter stated the ability to trade in increments of smaller than a penny in certain circumstances as means of suggesting that there may be no need for rulemaking.[1058] However, it is not possible to post a displayed quote at an increment other than a penny. The economic forces

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Program Approval Order); and Nasdaq BX Equity Rule 4780; Exchange Act Release No. 73702 (Nov. 28, 2014), 79 FR 72049 (Dec. 4, 2014) (NASDAQ BX Retail Pilot Program Approval Order).

1054 See discussion in supra section III.C.1.

1055 See specifically, NYSE Retail Liquidity Program Approval Order, supra note 1053, at 40679. The Commission stated that "[i]nternalizing broker-dealer[s] can offer sub-penny executions, provided that such executions do not result from impermissible sub-penny orders or quotations" by "typically select[ing] a sub-penny price for a trade without quoting at that exact amount or accepting orders from retail customers seeking that exact price."

1056 See, e.g., UTP Participant Input Specification (April 2024), available at https://www.utpplan.com/DOC/UtpBinaryInputSpec_Fractional.pdf.

1057 See Proposing Release, supra note 11, at 80272 n.70 (citing to industry and academic discussions on why RLPs may not attract significant retail order flow).

1058 See Lewis Letter at 33-34, attached to Virtu letter II.

that govern the tradeoffs in determining the tick size depend on the quote being displayed, ranked, and accepted. The empirical analysis also pertains to displayed quotes.

b. Analysis of Quoted Spreads under Current Ticks

This section discusses empirical analysis by the Commission on the prevalence of trading at different quoted spread ranges, defined in the Proposing Release using the concept of TWAQS.[1059] To document the prevalence of trading at different quoted spread ranges, Table 3 presents data on trading volume in 2023 based on average time weighted quoted spreads throughout the entire year for NMS stocks with a quotation, order, or indication of interest priced equal to or greater than $1.00 per share.[1060] The analysis breaks trading volume each day into one of 17 average quoted spread bins, beginning with stocks that have TWAQS less than or equal to $0.011.[1061] Table 3 also reports the daily average number of stocks in each bin.

The data analysis in Table 3 indicates that under the current tick size regime in 2023, 65.2% of share trading volume (31.5% of dollar volume) occurred in stocks in the first average quoted spread bin of $0.011 or less. Table 3 also reports that an additional 9.1% of share volume (15.3% of dollar volume) occurred in stocks with quoted spreads between $0.011 and $0.015. In

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1059 See Proposing Release, supra note 11, Table 4.

1060 The data derived in Table 3 was derived using the same methodology as corresponding Table 4 in the Proposing Release (PR Table 4). See Proposing Release, supra note 11, at 80308. The only differences between the tables are that Table 3 uses data for all trading days in 2023 (instead of from Jan. to May 2022 in PR Table 4), and Table 3, because of our policy choice to set the minimum tick size at 0.5c (for quotes and orders priced $1.00 or more for NMS stocks that have a TWAQS of $0.015 or less), adds tick size bins for quoted spreads from 1.1c to 1.5c and 1.5c to 2c.

1061 Because of the $0.01 minimum quoting increment for NMS stocks priced equal to or greater than $1.00 per share, a stock cannot have a quoted spread less than $0.01 unless markets become locked or crossed. The existence of locked and crossed markets can in some cases result in time weighted quoted spread that are very slightly lower than $0.01. However, even for stocks with spreads most constrained by the tick, even a faction of a second spent with a higher spread would likely result in an average quoted spread higher than $0.01. For example, a large trade can exhaust liquidity deeper in the limit order book such that the stock's quoted spread temporarily increases from $0.01. Thus, time weighed quoted spreads will virtually always be greater than $0.01. This makes $0.011 a more pragmatic minimum cutoff for empirical analysis than $0.01.

sum, in Table 3, in 2023, approximately 74.3% of share volume (46.8% of dollar volume) transacted in NMS stocks (specifically, NMS stocks with a quotation, order, or indication of interest priced equal to or greater than $1.00 per share) which have a quoted spread that is likely to be constrained by the minimum pricing increment,[1062] which as discussed both above (section VII.B.2) and below (VII.D.1) increases transaction costs.

Table 3: Share Volume by Quoted Spread 2023[a]

Quoted Spread	Share Volume (%)	Dollar Volume (%)	Average # Stocks
Quoted Spread ≤ $0.011	65.2%	31.5%	1,782
$0.011< Quoted Spread <= $0.015	9.1%	15.3%	638
$0.015< Quoted Spread <= $0.02	4.2%	5.2%	560
$0.02 < Quoted Spread <= $0.03	5.7%	8.4%	1,036
$0.03 < Quoted Spread <= $0.04	3.6%	7.6%	811
$0.04 < Quoted Spread <= $0.05	2.1%	3.6%	673
$0.05 < Quoted Spread <= $0.06	1.5%	2.3%	582
$0.06 < Quoted Spread <= $0.07	1.2%	2.1%	522
$0.07 < Quoted Spread <= $0.08	1.0%	1.8%	445
$0.08 < Quoted Spread <= $0.09	0.8%	1.6%	377
$0.09 < Quoted Spread <= $0.10	0.7%	1.6%	317
$0.10 < Quoted Spread <= $0.11	0.6%	1.5%	271
$0.11 < Quoted Spread <= $0.12	0.5%	1.3%	222
$0.12 < Quoted Spread <= $0.13	0.4%	1.1%	187
$0.13 < Quoted Spread <= $0.14	0.3%	1.1%	163
$0.14 < Quoted Spread <= $0.15	0.3%	1.0%	144
$0.15 < Quoted Spread	2.8%	13.0%	2,177

[a] This table provides share volume by stocks with different quoted spread profiles. To create this table, for each day the universe of stocks (identified by a unique stock variable) covered in the WRDS Intra-Day Indicators data are assigned into one of the 17 quoted spread bins based on that day's time-weighted quoted spread as computed by

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[1062] For the share volume, 74.3% = 65.2% (i.e., Quoted Spread ≤ $0.011) + 9.1% (i.e., $0.015 < Quoted Spread <= $0.02). For the dollar volume, 46.8% = 31.5% (i.e., Quoted Spread ≤ $0.011) + 15.3% (i.e., $0.015 < Quoted Spread <= $0.02). See supra section VII.B.2 for a definition of tick-constrained; see also Proposing Release, supra note 11, Table 4, which used the same methodology and estimated that, in the first six months of 2022, 56% of share volume transacted in NMS stocks with a quoted spread of < $0.011, while an additional 15% of share volume traded in stocks with a quoted spread of $0.011 < and <= $0.02.

WRDS Intra-Day Indicators. Then all share and dollar trading volume across all trading days in 2023 is aggregated for each of the 17 quoted spread bins. Percentages based on these totals are then computed. This table also presents the daily average number of stocks in each bin. To compute this variable, for each trading day in 2023, the number of stocks in each bin is tabulated, then the average across all trading days is presented here. Certain items in this Table 3 may also be affected by the MDI Rules once they are fully implemented. See infra section VII.C.3.

c. Reverse Stock Splits

A reverse split exchanges a fixed number of existing shares for a smaller number of new shares. The new shares have a higher price, but there are fewer of them.[1063] For example, if an issuer undergoes an 8-for-1 reverse split, eight shares are exchanged for one share that is worth the same as the eight, increasing the price by a factor of eight. All else equal, one would expect the quoted spread, which represents the per-share trading costs to also rise by a factor of eight. Thus, the cost of transacting in the stock, for a given dollar exposure, would remain constant. However, if a stock were tick constrained, undergoing a reverse split would cause the tick to become smaller relative to the (higher) stock price, thereby alleviating the tick constraint and reducing transaction costs.[1064]

[1063] See, e.g., General Electric, GE Reverse Stock Split Frequently Asked Questions as of September 21, 2021, at 1, available at https://www.ge.com/sites/default/files/GE_Reverse_Stock_Split_FAQs.pdf (last accessed July 27, 2024). See also FINRA, Stock Splits, available at https://www.finra.org/investors/investing/investment-products/stocks/stock-splits.

[1064] For example, suppose a stock trades at $10 per share and is tick-constrained such that it trades with a quoted spread of $0.01, but could sustain a quoted spread of $0.004 if not for the penny tick. If the stock undergoes a 5-for-1 reverse split, then the share price would rise to $50 (5*$10) and the quoted spread would rise to $0.02 (5*$0.004). The reverse split thereby alleviates the tick constraint. The reverse split also reduces trading costs in this case. To see the reduction in costs, suppose an investor wants to submit a market order for $100 worth of the stock. With a $10 price and a $0.005 half-spread, this would entail purchasing five shares and paying a transaction cost of $0.025 (i.e., five times the half-spread of $0.005). With a $50 price and a $0.01 half-spread, however, the market order would only entail purchasing two shares and paying a transaction cost of $0.02 (i.e., two times the half-spread of $0.01), thus reducing transaction costs by 25%. See infra note 1295 and surrounding discussion for empirical studies documenting a reduction in trading costs when tick-constrained stocks complete a reverse split.

Using this logic, one commenter pointed out that currently the problem that the Commission identifies with regard to tick constrained stocks could be solved without Commission action by issuers making the decision to undergo a reverse stock split.[1065] The commenter further states, "[t]he fact that issuers do not discuss this indicates the issue is immaterial to them."[1066] While the Commission agrees that a reverse split alleviates the tick constraint, there may be reasons that an issuer may choose not to undergo a reverse split apart from an assessment of the immateriality of tick constraints. Reverse splits have historically been associated with negative stock returns.[1067] Research suggests that this may be because the market views stock splits as a signal,[1068] and issuers may not wish to give the appearance of bad news with a reverse split. Reverse splits also change the share price, which may affect the trading characteristics of the stock.[1069] In addition, the direct administrative costs of a stock split for a large issuer are estimated to be between $250,000 and $800,000 (as of 2009).[1070] Finally, an

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1065 See Virtu Letter II at 25.

1066 Id. at 25.

1067 See, e.g., Hemang Desai & Prem C. Jain, Long-Run Common Stock Returns Following Stock Splits and Reverse Splits, 70 J. BUSINESS 3 (July 1997); Kim et al., Return Performance Surrounding Reverse Stock Splits: Can Investors Profit?, 37 FIN. MGMT. 2 (Summer 2008).

1068 For a discussion on the signal conveyed by stock splits, see, e.g., Maureen McNichols & Ajay Dravid, Stock Dividends, Stock Splits, and Signaling, 45 J. FIN. 3 (July 1990); David L. Ikenberry et al., What Do Stock Splits Really Signal?, 31 J. FIN. & QUANTITATIVE ANALYSIS 3 (Sept. 1996). The academic literature on signaling generally uses stock splits (rather than reverse splits) because standard databases do not include the announcement date of reverse splits, which makes the measurement of the market reaction to the announcement of a reverse split imprecise. Once the reverse split is completed, however, the academic literature documents negative returns—see id.

1069 See, e.g., Kelly Shue & Robert Townsend, Can the Market Multiply and Divide? Non-Proportional Thinking in Financial Markets, 76 J. FIN 5 (Oct. 2021). This paper documents greater return responses to news in lower-priced stocks and hypothesizes that some investors think about stock price changes in terms of dollars rather than returns. The paper studies reverse stock splits and finds evidence consistent with this hypothesis.

1070 See Weld et al., The Nominal Share Price Puzzle, 23 J. ECON. PERSPECTIVES 2 (Spring 2009). The authors estimate the administrative costs of stock splits. Reverse stock splits are likely to have similar administrative costs. After adjusting for changes in the consumer price index from 2009 to 2024, the paper's estimated direct administrative cost of a split for a large issuer in 2024 is $365,000 to $1,170,000.

issuer may not capture all of the benefits of the liquidity arising from the reverse split and the alleviated constraints. In sum, though reverse stock splits may address tick constraints, they are an inefficient solution for tick constrained securities. One commenter agreed, stating that "while issuers can make pricing in their securities more or less granular through reverse or forward splits, it's not practical for the SEC and the industry to rely on them to do so."[1071]

2. Access Fees

This section discusses current regulation on the access fee cap, the current practices at exchanges for setting access fees and rebates, and Commission analysis showing that most exchanges assess access fees close to the current access fee cap and use these access fees to principally fund rebates.

a. Current Regulations

Preexisting Rule 610(c) limits the fees that trading centers can charge for accessing protected quotations with prices of $1.00 per share or greater to $0.0030 per share (or 30 cents per 100 shares). This level is commonly referred to as 30 mils.[1072] Preexisting Rule 610 also prohibits access fees in excess of 0.3% of the price for stocks priced less than $1.00 per share. The 30 mil fee cap was adopted as a part of Regulation NMS in conjunction with the order protection rule and was implemented to prevent trading centers from charging excessive fees to orders that were required to trade with a protected quote.[1073] The 30 mil fee cap was also set

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1071 See The Tick Size Debate Revisited attached to MEMX Letter at 69.

1072 See Proposing Release, supra note 11, at 80309.

1073 See Regulation NMS Adopting Release, supra note 4, at 37545 (justifying the 30 mil limit: "For quotations to be fair and useful, there must be some limit on the extent to which the true price for those who access quotations can vary from the displayed price . . . . To protect limit orders, orders must be routed to those markets displaying the best-priced quotations. This purpose would be thwarted if market participants were allowed to charge exorbitant fees that distort quoted prices"); see also supra note 434 and surrounding discussion from the Regulation NMS Adopting Release on the potential—absent a fee cap—for high fee markets to take advantage of intermarket price protections.

based on existing market practices at the time.[1074] Rule 610(c) only regulates fees to access protected quotes; it does not regulate fees to access non-protected quotes, nor does it regulate rebates that exchanges can offer. However, the 30 mil fee cap has become a central component of the structure of fees and rebates as access fees for non-protected quotes generally do not exceed the 30 mil fee cap, nor do typical rebates.[1075]

b. Current Practices at Exchanges

The transaction fee structure on an exchange currently takes one of three forms. The most common is maker-taker, in which liquidity demanders (i.e., takers) are assessed the access fee and liquidity providers (i.e., makers) are offered a rebate. Exchanges can also be inverted (also known as taker-maker), in which liquidity demanders are offered a rebate and liquidity providers are assessed an access fee.[1076] The last form of fee structure is flat; a flat exchange either charges one or both sides a fee but does not offer rebates. While the exchanges are free to subsidize rebates beyond what they earn through collecting access fees, in practice this does not appear to happen.[1077] The difference between the average access fee charged and the average rebate paid is the net capture earned by the exchanges for facilitating a transaction.[1078]

1074 See id. at 37503 (the 30 mil access fee cap was chosen because "it will not seriously interfere with current business practices" and "[i]n the absence of a fee limitation, some 'outlier' trading centers might take advantage of the requirement to protect displayed quotations by charging exorbitant fees to those required to access the outlier's quotations"); see also supra note 357.

1075 See infra Table 4 for a summary of transaction-based fee schedules for U.S. national equities exchanges as of Feb. 2024.

1076 While Rule 611 creates incentives for exchanges to use high fees and rebates in order to quote at the NBBO—see infra note 1120–not all exchanges compete on this margin (e.g., inverted exchanges).

1077 See infra section VII.D.2 for more discussion on why exchanges may not subsidize rebates from other sources of revenue; see also Eric Budish, et al., A Theory of Stock Exchange Competition and Innovation: Will the Market Fix the Market? (working paper May 22, 2019) available at https://ssrn.com/abstract=3391008 (retrieved from SSRN Elsevier database).

1078 See Proposing Release, supra note 11, at 80291 n.304 (''Net capture'' is the amount earned by the trading center for facilitating a transaction, which is typically the difference between the average access fee

The regulatory access fee cap is most relevant for maker-taker markets where the trader accessing a protected quote must pay the access fee. This is because the access fee cap applies only to fees for accessing protected quotations and does not apply to fees for posting quotations. On an inverted venue, the exchange is not restricted by preexisting Rule 610 in terms of the rebate that it can offer to access a protected quote or the fee to post a protected quote.[1079] Flat rate venues, which do not offer rebates, do not appear to be economically constrained by the preexisting Rule 610(c) as their fees for both taking and adding liquidity are significantly lower than the 30 mil fee cap.[1080]

Fee/rebate schedules can be quite complex, and the fee schedules change frequently.[1081] As was discussed in the Proposing Release,[1082] the actual fee or rebate that an exchange member is assessed on most exchanges also generally depends on which tier a market participant falls into based on trading volume in that month, with higher-volume market participants typically receiving a higher rebate or a lower fee.[1083] Exchanges file their fee and rebate schedules with

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charged by the trading center and the average rebate paid by the trading center"). It is common practice across exchanges to fund their rebates with transaction fees. In principle rebates could exceed access fees as, unlike access fees, there is no regulatory cap restricting the rebates that can be offered. However, it is unlikely that trading venues would offer rebates in excess of the fees collected as doing so would expose them to the possibility of large losses. See supra note 1101 and accompanying text for further discussion on exchanges' net capture rates.

1079 As can be seen from Table 4, which presents information on access fees and rebates for the 16 operating exchanges, in practice the fee that is charged on an inverted fee venue to post liquidity is generally very close to the 30 mil access fee cap even though not constrained by Rule 610.

1080 As can be seen from Table 4, the only flat exchange (LTSE) is one that does not levy either a fee or rebate and prior to adopting a maker-taking fee model another exchange (IEX) had charged both sides of the transaction 9 mils. See Proposing Release, supra note 11, at 80311.

1081 See Table 4 for information on how often exchanges amend their fees.

1082 See Proposing Release, supra note 11, at 80292.

1083 See Letter from Richard Steiner, Electronic Trading Strategist, RBC Capital Markets, to Brent Fields, Secretary, Commission (Oct. 16, 2018), available at https://www.sec.gov/comments/s7-05-18/s70518-4527261-176048.pdf (commenting on the transaction fee pilot); see also the Fee Tiers Proposal, supra note 437.

the Commission and post them on their websites. While this means that the rebate and fee rates associated with each volume-based tier can be known at the time a market participant trades, market participants may not know which volume-based tier they will fall under at the time of the trade (and thus the fee or rebate rate that will apply to their particular trade) because the tier they will fall under is typically determined based on their trading volume during the current month, which is not finalized until the end of the month.[1084] More specifically, the volume-based fees or rebates a market participant receives from an exchange are often determined by a market participant's average total daily traded share volume on the exchange during the month as a percentage of either the average total daily market volume reported by one of the consolidated tapes during the month or as a percentage of the average total daily market volume reported by all consolidated tapes during the month.[1085] It is therefore, as one commenter stated, difficult for

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1084 See Chester Spatt, Is Equity Market Exchange Structure Anti-Competitive? (Dec. 28, 2020), available at https://www.cmu.edu/tepper/faculty-and-research/assets/docs/anti-competitive-rebates.pdf. However, not all exchanges offer volume-based tiers in their fee structures. For example, LTSE does not charge fees to transact. For exchanges like these, it is possible to determine with certainty the cost to transact prior to executing a trade.

1085 The Equity Data Plans disseminate SIP data over three separate networks: (1) Tape A for securities listed on the New York Stock Exchange ("NYSE"); (2) Tape B for securities listed on exchanges other than NYSE and Nasdaq; and (3) Tape C for securities listed on Nasdaq. These tapes are referred to as the "consolidated tapes." The CTA Plan governs the collection, consolidation, processing, and dissemination of last sale information for Tape A and Tape B securities. The CQ Plan governs the collection, consolidation, processing, and dissemination of quotation information for Tape A and Tape B securities. Finally, the UTP Plan governs the collection, consolidation, processing, and dissemination of last sale and quotation information for Tape C securities. For details on exchange volume based fees and rebates, see, e.g., Add and Remove Rates, Nasdaq, available at http://www.nasdaqtrader.com/Trader.aspx?id=PriceListTrading2; New York Stock Exchange Price List 2024, NYSE, available at https://www.nyse.com/publicdocs/nyse/markets/nyse/NYSE_Price_List.pdf; and Cboe U.S. Equities Fee Schedules EDGX Equities, CBOE, available at https://www.cboe.com/us/equities/membership/fee_schedule/edgx/. See also the Fee Tiers Proposal supra note 437 at 76284-88, describing Commission concerns about the effect of tiers on competition among exchange members, conflicts of interest between members and their customers, and competition between exchanges.

market participants to forecast trading costs.[1086] Hence, market participants currently typically have to make trading decisions without the ability to determine their full trading costs.

Broker-dealers trading in an agency capacity may pass fees and rebates received from exchanges while working a customer's order through to the customer, either directly or through a change in the commission charged for the order. One commenter stated that passing through transaction fees and rebates is not common.[1087] The Commission is uncertain the extent to which transaction fees and rebates are passed through to customers, or in what form. It is possible that fees and rebates are passed through indirectly in the form of payment for order flow or in price improvement. For example, one broker-dealer's 606 reports, in discussing orders routed to a wholesaler, acknowledged that exchange rebates may affect the wholesaler's subsequent routing decision, but that those rebates could be used to provide price improvement to the broker-dealer's customers or order flow payments to the broker-dealer.[1088] As discussed in the Proposing Release, the Commission is uncertain of how much demand currently exists for rebates to be passed through to end customers.[1089]

Market participants who are not themselves broker-dealers may access information on exchange fees and rebates through reports available under Rule 606. With respect to held orders,

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1086 See Council of Institutional Investors Letter at 4 (stating "It is our understanding that currently exchanges use volume-based tier schedules that depend on the current month's trading volume. As a result, the per-transaction fee or rebate cannot be known when the trade occurs. This significantly impedes the ability of institutional investors and other market participants 'to evaluate the total price of a trade at the time of execution and . . . [the] ability to evaluate best execution and order routing.'").

1087 See Harris Letter at 12 ("Almost all retail and many institutional brokers pay the taker fee and keep the maker rebate when trading on behalf of their clients.").

1088 See E*Trade.com, Morgan Stanley Smith Barney LLC - Held NMS Stocks and Options Order Routing Public Report, 1st Quarter, 2024, at 2, available at https://cdn2.etrade.net/1/24043013500.0/aempros/content/dam/etrade/retail/en_US/documents/pdf/order-routing-reports/2024/606-MSWM-2024Q1.pdf.

1089 See Proposing Release, supra note 11, at 80330.

Rule 606(a)(1) requires broker-dealers to produce quarterly public reports regarding their routing of non-directed orders[1090] in NMS stocks that are submitted on a held basis. Along with other information, these reports require the broker-dealer to report both the total dollar amount and per share average of net transaction fees paid and net transaction rebates received for different order types for each trading venue to which the broker-dealer reports routing orders.[1091] Additionally, Rule 606(b)(3) requires broker-dealers to produce reports pertaining to order handling upon the request of a customer that places, directly or indirectly, one or more orders in NMS stocks that are submitted on a not held basis, subject to a de minimis exception.[1092] For each venue to which the broker-dealer routed the customer's orders, these reports require the broker-dealer to disclose, among other things, the average net execution rebate or fee for shares of orders providing liquidity and the average net execution rebate or fee for shares of orders removing liquidity.[1093] However, these reports provide market participants with information only on historical average transaction fees and rebates and may not accurately reflect the current exchange fees and rebates a market participate will encounter at the time of its transaction.[1094]

1090 A "non-directed order" means any order from a customer other than a directed order. See 17 CFR 242.600(b)(56). A "directed order" means an order from a customer that the customer specifically instructed the broker or dealer to route to a particular venue for execution. See 17 CFR 242.600(b)(27).

1091 Rule 606(a)(1) requires broker-dealers to report separate information for market orders, marketable limit orders, non-marketable limit order, and other orders. See 17 CFR 242.606(a)(1) for the items that need to be disclosed in reports under rule 606(a)(1).

1092 See 17 CFR 242.606(b)(3). In addition, under rule 606(b)(5)'s customer-level de minimis exception, broker-dealers need not provide upon request execution quality reports for customers that traded on average each month for the prior six months less than $1,000,000 of notional value of not held orders in NMS stocks through the broker-dealer. See 17 CFR 242.606(b)(5).

1093 See 17 CFR 242.606(b)(3)(iii) and (iv).

1094 Reports under rule 606(a)(1) are produced by broker-dealers at the end of the quarter and disclose information on average fees and rebates for each month in that quarter. Reports issued by broker-dealers to their customers under rule 606(b)(3) disclose summarized information on the handling of the customer's orders for each calendar month over the prior six months. The broker-dealer must issue these reports to the customer within seven business days of receiving the customer's request.

c. Analysis of Current Access Fees and Rebates

The Commission analyzes, in Table 4, current fee and rebate schedules, based on Rule 19b-4 filings with the Commission, for each of the equity exchanges operating in the United States as of February 8, 2024,[1095] as well as the transaction prices that each exchange posts.[1096] What is apparent from this analysis is that the current structure of fees and rebates is complex and constantly changing.[1097] Each exchange, except LTSE which does not charge transaction fees, filed an average of 13.6 Rule 19b-4 equity market fee filings with the Commission in 2023. Market participants interacting with all exchanges had to adjust to 218 total fee filings in 2023. Each filing can contain changes for numerous fee and rebate categories.

The effect of the 30 mils fee cap as an anchor point is also apparent. For most exchanges the maximum fee assessed, presumably for non-protected quotes, is close to the 30 mils fee cap for protected quotes. The maximum rebate is generally in the vicinity of 30 mils, further suggesting the 30 mils access fee cap effectively limits what the exchanges offer as rebates. Some exchanges offer different access fees and rebate schedules for retail versus non-retail trades.[1098]

1095 Table 4 is constructed using the same methodology as Table 5 of the Proposing Release, supra note 11, at 80311; the only difference is that Table 4 herein uses data as of Feb. 2024 and computes fee revisions during the 2023 calendar year, whereas Table 5 of the Proposing Release used data as of May 2022 and computed annual fee revisions from 2018 to June of 2022. Any differences between these two tables are due to changes in exchange fee schedules from May 2022 to Feb. 2024.

1096 Panel A of Table 4 provides the category of exchange, maker-taker, inverted, or flat/free, the number of fee revisions since Jan. 2018 as indicated by the number of transaction fee specific rule 19b-4 filings that the exchange has filed with the Commission, the date that each exchange's website states that the fee schedule posted there is effective and the range of fees and rebates along with the number of categories of fees and rebates for transactions priced equal to, or greater than, $1.00 per share.

1097 Some commenters have also stated that current transaction pricing practices introduce complexity into the market and reduce transparency. See Themis Letter at 7; BMO Letter at 3.

1098 See, e.g., New York Stock Exchange (NYSE), Equity Fees and Charges, NYSE.COM, available at https://www.nyse.com/publicdocs/nyse/markets/nyse-arca/NYSE_Arca_Marketplace_Fees.pdf (accessed

Panel B of Table 4 provides information on the exchange's fee schedules for stocks priced lower than $1.00. For these transactions, the fee schedules tend to be simpler. Most exchanges do not offer a rebate for transactions lower than $1.00 even if the exchange offers rebates for other transactions – only three exchanges offer any sort of baseline rebate.[1099] Additionally, the exchanges tend to charge an access fee of 0.1% with some also charging the maximum access fee of 0.3% of the share price. Only one exchange charges a fee of 0.1% to both sides of a transaction.

Table 4: Summary of Transaction-Based Fee Schedules for U.S. National Equities Exchanges as of February 2024[a]

Panel A: Fees and Rebates for Transactions Greater than $1.00

Exchange	Fee Model	Number of Revisions 2023	Date of Fee Schedule	Fees (# of Categories)	Rebates (# of Categories)
Cboe BZX[b]	Maker-Taker	42	1/2/2024	$0.0030] (1)	[$0.0016-$0.0031 (7)
Cboe BYX[c]	Inverted	9	2/1/2024	$0.0012-$0.0020 (10)	$0.0015-$0.0020 (4)
Cboe EDGA[d]	Inverted	14	2/7/2024	$0.0000-$0.0030 (12)	$0.0016-$0.0024 (5)
Cboe EDGX[e]	Maker-Taker	44	2/1/2024	$0.00275-$0.0030 (3)	$0.0020-$0.0034 (8)
BX[f]	Inverted	6	2/1/2024	$0.0020-$-$0.0030 (2)	$0.0005-$0.0018 (7)
Phlx (PSX)[g]	Maker-Taker	4	2/1/2024	$0.0030 (1)	$0.0020-$0.0033 (5)
Nasdaq[h]	Maker-Taker	6	2/1/2024	$0.0030] (1)	$0.0013-$0.00305 (26)
	Maker-Taker	11	2/1/2024	$0.0000-$0.0030	$0.0000-$0.0032

June 18, 2024); see also Virtu Letter II at 23 suggesting that the Commission could consider an alternative which would allow exchanges to offer differing fee schedules to retail and non-retail orders.

[1099] The three are Cboe EDGX, MEMX, and MIAX Pearl.

NYSE Arca[i]				(6)	(6)
NYSE American	Maker-Taker	7	1/3/2024	$0.0025-$0.0030 (3)	$0.0016-$0.0030 (3)
NYSE	Maker-Taker	16	1/12/2024	$0.0000-$0.00275 (5)	$0.0004-$0.0030 (11)
NYSE National	Inverted	5	1/3/2024	$0.0022-$0.0029 (4)	$0.0007-$0.0030 (5)
NYSE Chicago	Maker-Taker	3	1/8/2024	$0.0010-$0.0030 (1)	$0.0000 (0)
IEX[j]	Maker-Taker	2	1/24/2024	$0.0000-$0.0010 (2)	$0.0004 (1)
MEMX[k]	Maker-Taker	22	2/1/2024	$0.00295-$0.0030 (2)	$0.0015-$0.0033 (6)
MIAX Pearl[l]	Maker-Taker	10	1/17/2024	$0.0024 (1)	$0.00295 (1)
LTSE[m]	Free	NA	N/A	$0.0000 (1)	$0.0000 (1)

Panel B: Fees and Rebates for Transactions Under $1.00

Exchange	Fee Model	Rebate	Fee	Charged Both Sides
Cboe BZX	Maker-Taker	0	0.30%	
Cboe BYX	Inverted	0	0.10%	
Cboe EDGA	Inverted	0	0%	
Cboe EDGX	Maker-Taker	0.00009 (per share)	0.30%	
BX	Inverted	0	0.10%	
Phlx (PSX)	Maker-Taker	0	0.30%	
Nasdaq	Maker-Taker	0	0.30%	
NYSE Arca	Maker-Taker	0	0.10%	
NYSE American	Maker-Taker	0	0.10%	
NYSE	Maker-Taker	0	0.10%	
NYSE National	Inverted	0	0%	
NYSE Chicago	Maker-Taker	0	0.10%	Yes
IEX	Maker-Taker	0	0.09%	
MEMX	Maker-Taker	0.075% (of value)	0.10%	
MIAX Pearl	Maker-Taker	0.15%(of value)	0.250%	
LTSE	Free	0	0%	

[a] The number of fee revisions is obtained by counting each Rule 19b-4 filing for each exchange that is not clearly marked for a non-transaction fee related purpose such as connectivity fees, listing fees, options fees, etc. To determine the fee and rebate information, the staff searched each exchange's webpage for its current posted access fee and rebate schedule and collected information on access

fees and rebates pertaining to non-auction trading in stocks priced equal to, or greater than, $1.00 per share. Sources for Current Access Fee Data were effective on the dates shown in Panel A of Table 4, and were accessed during February 2024 at the websites shown beneath the table.
[b] https://www.cboe.com/us/equities/membership/fee_schedule/bzx/
[c] https://www.cboe.com/us/equities/membership/fee_schedule/byx/
[d] https://www.cboe.com/us/equities/membership/fee_schedule/edga/
[e] https://www.cboe.com/us/equities/membership/fee_schedule/edgx/
[f] https://www.nasdaqtrader.com/trader.aspx?id=bx_pricing
[g] https://www.nasdaqtrader.com/trader.aspx?id=psx_pricing
[h] https://www.nasdaqtrader.com/Trader.aspx?id=PriceListTrading2
[i] All NYSE Exchange Family fees: https://www.nyse.com/markets/fees
[j] https://exchange.iex.io/resources/trading/fee-schedule/ (Note: that the majority of IEX trading occurs via non-displayed orders. IEX only pays rebates on displayed orders.)
[k] https://info.memxtrading.com/equities-trading-resources/us-equities-fee-schedule/
[l] https://www.miaxglobal.com/sites/default/files/fee_schedule-files/MIAX_Pearl_Equities_Fee_Schedule_01172024.pdf
[m] https://ltse.com/trading/faqs

Complex fee schedules and volume-based tiers mean that it is difficult for the Commission to determine the net capture on a given exchange (the difference between average fees levied and rebates paid).[1100] Additionally, financial statements for exchange groups generally do not break down performance on a per-venue level and the financial statements generally combine auction access fees collected with regular trading access fees. Furthermore, some exchanges are privately held and thus do not release the same financial statements that public exchanges do. Using information from the financial statements of the three major exchange groups which collectively account for the overwhelming majority of trading volume on exchanges, the Commission estimates that the average total net capture is around 4 mils for all

[1100] Volume-based tiers imply that the net capture varies by exchange member. To calculate an exchange's net capture would require knowing the number and types of orders that are executed by each member, mapping these orders to the exchange's fee schedule, calculating the net capture for each member, and then aggregating the net capture over all exchange members.

trading types.[1101] However, the Commission understands based on staff conversations with industry members that the net capture for non-auction trading in stocks that have a price equal to or greater than $1.00 is likely close to 2 mils on most exchanges,[1102] and in the analysis in later sections where the net capture needs to be assumed, we use 2 mils unless otherwise stated.[1103] A commenter agreed stating that the net fee is typically only 2 mils per share, stating, "it is worth pausing to reflect on just how competitive this net fee is—this is about as close to Bertrand price competition as one sees."[1104] Another commenter reported estimated trading related "all-in" costs to trade ranging 1.9 to 3.4 mils over the 2017 to 2021 period for the three largest exchange groups (Cboe, Nasdaq, and NYSE); [1105] these estimates are broadly in line with the estimated net-capture rates and consistent with the 2 mil net capture rate assumption used in the subsequent analysis.[1106] Given the low net capture rate of 2 mils on most exchanges, the primary reason that

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1101 Intercontinental Exchange, the parent firm of NYSE, reports on page 53 of its 2021 Form 10-K filing that their net capture for U.S. equity transactions was approximately 4.2 mils in 2021. Nasdaq did not report its net capture in its Form 10-K filing, however Nasdaq provides information on its investor relations webpage which, when we average the relevant 2021 volumes, indicates that the average net capture across all Nasdaq platforms for U.S. equity transactions was 5.9 mils. See Nasdaq 2022/2021 Monthly Volumes, Nasdaq, available at https://ir.nasdaq.com/static-files/465d2157-c476-4546-a9f7-8d7ad0c9be77). Cboe reports in its Form 10-K filing that its net capture for U.S. equity transactions was approximately 2 mils.

1102 Non-auction orders exclude opening, closing, and reopening auctions. See Table 7, note a for additional details regarding which orders are considered for estimation.

1103 One commenter stated that exchanges subsidize rebates with other sources of revenue as manifest by the fact that some market participants could receive rebates in excess of the 30 mil fee cap. See Healthy Markets Letter I at 23. Table 4 presents evidence consistent with the notion that in some cases rebates received may be in excess of 30 mils. However, the commenter did not provide any analysis to suggest that the net capture of the exchanges was, on average, negative. As discussed, the Commission believes that most exchanges, on average, earn approximately 2 mils per transaction priced greater than $1.00. One exception is IEX which earns an estimated 6 mils based on the information in Table 4.

1104 See Budish Letter at 3. Bertrand competition is an economics model of competition on the basis of prices whereby firms set their price—net price in this instance—at marginal cost.

1105 The commenter also included similar estimates for IEX which ranged from 6.8-8.9 mils, see Nasdaq Letter II at 3.

1106 Subsequent analysis in section VII.D.2 assumes that the assumed 2 mil net capture will continue to be valid following the implementation of the amendments.

access fees remain near 30 mils on most exchanges is likely to fund rebates.[1107] For stocks trading below $1.00 the Commission estimates an average net capture of around 0.24% of the transaction volume.[1108] This amount is close to the 0.30% access fee cap and arises because, as seen in Panel B of Table 4, much of the trading for sub $1.00 priced volume takes place on exchanges which set their baseline fee at or near 0.30% but do not offer baseline rebates for transactions under $1.00. On a per-share basis, this net capture of 0.24% of transaction dollar volume corresponds to a net capture of 7.3 mils.[1109]

Table 5 presents tabulations of the total share (Panel A) and dollar (Panel B) trading volume executed on the 16 exchanges in 2023.[1110] This table provides estimates for the total volume that executed below $1.00, and that which executed above $1.00. These numbers represent an estimate of the total number of shares that will have been subject to the access fees and rebates discussed in this release.

Table 5: Trading volume by Exchange, Exchange Type 2023[a]

Panel A: Share Volume

Exchange Name	Exchange Type	<$1 Volume (Billions)	>=$1 Volume QS<= $0.015 (Billions)	>=$1 Volume QS > $0.015 (Billions)	% of Exchange Volume

1107 See Retirement Coalition Letter at 1 ("in practice, this 'cap' has come to be used as the standard rate charged to access quotes at most exchanges, and almost all of those fees are then 'rebated' to liquidity providers").

1108 The estimate for the 0.24% net capture is obtained by taking the total estimated net transaction fee across all exchanges for trading in shares priced below $1.00 ($83.2 million) and dividing this number by the total sub $1.00 dollar volume from Panel B of Table 5 below ($34.2 billion). 100*83.2million/34.2 billon ≈%0.24.

1109 To estimate the net capture in terms of mils, the Commission divides the dollar revenue from fees by the number of shares traded. The dollar net capture is 0.24%, see id.,) and the dollar volume is $34.2 billion, see Table 5, Panel B, resulting in a dollar revenue of $82 million (0.0024*$34.2 billion). With share volume of 112.6 billion, see Table 5, Panel A, the net capture is 7.3 mils ($82 million / 112.6 billion).

1110 Table 5 is constructed using the same methodology as Table 6 of the Proposing Release, supra note 11, at 80313; Table 5 herein uses data for 2023, whereas Table 6 of the Proposing Release used data for the first half of 2022.

Off-Exchange		192.9	620.3	241.3	
Nasdaq	Maker-Taker	26.8	226.2	88.9	26.9%
NYSE Arca	Maker-Taker	27.5	139.3	30.4	15.5%
NYSE	Maker-Taker	3.4	127.4	37.4	13.2%
Cboe BZX	Maker-Taker	14.0	86.3	20.9	9.5%
Cboe EDGX	Maker-Taker	21.1	98.2	23.3	11.2%
MEMX	Maker-Taker	8.1	61.9	12.0	6.5%
IEX	Maker-Taker	1.7	38.9	19.5	4.7%
Cboe EDGA	Inverted	2.7	33.8	5.6	3.3%
Cboe BYX	Inverted	2.6	20.4	2.8	2.0%
MIAX Pearl	Maker-Taker	2.4	41.9	2.7	3.7%
NYSE National	Inverted	0.5	11.0	1.4	1.0%
Nasdaq OMX PSX	Maker-Taker	0.3	7.5	1.9	0.8%
Nasdaq OMX BX	Inverted	0.5	6.7	2.6	0.8%
NYSE American	Maker-Taker	1.0	4.8	1.0	0.5%
NYSE Chicago	Flat	0.2	0.8	1.8	0.2%
LTSE	Flat	0.0	0.0	0.0	0.0%
	Total	305.5	1,525.4	493.5	
	Exchange Total	112.6	905.1	252.2	

Panel B: Dollar Volume

Exchange Name	Exchange Type	<$1 Volume (Billions)	>=$1 Volume QS<= $0.015 (Billions)	>=$1 Volume QS > $0.015 (Billions)	% of Exchange Volume
Off-Exchange	-	65.3	19,744.9	24,508.4	
Nasdaq(TapeC)	Maker-Taker	9.1	9,008.3	9,402.3	30.4%
NYSE Arca	Maker-Taker	7.6	6,433.3	3,107.1	15.8%
NYSE	Maker-Taker	1.5	3,985.9	3,658.6	12.6%
Cboe BZX	Maker-Taker	3.1	3,711.6	2,479.9	10.2%
Cboe EDGX	Maker-Taker	6.2	3,450.0	2,371.1	9.6%
MEMX	Maker-Taker	2.5	2,148.8	1,130.4	5.4%
IEX	Maker-Taker	0.8	1,383.8	2,119.0	5.8%
Cboe EDGA	Inverted	1.0	1,038.0	494.8	2.5%
Cboe BYX	Inverted	0.9	657.2	275.3	1.5%
MIAX	Maker-Taker	0.7	1,297.3	268.4	2.6%
NYSE National	Inverted	0.2	287.3	131.0	0.7%
Nasdaq OMX PSX	Maker-Taker	0.1	368.9	211.9	1.0%
Nasdaq OMX BX	Inverted	0.2	274.9	258.7	0.9%
NYSE American	Maker-Taker	0.4	165.5	97.7	0.4%
NYSE Chicago	Flat	0.1	39.6	236.0	0.5%
LTSE	Flat	0.0	1.5	1.6	0.0%

Total	99.4	53,996.9	50,752.2
Exchange Total	34.2	34,252.0	26,243.9

[a] This table aggregates all trade information from the TAQ database for every trading day in 2023. Only trading volume reflecting normal trades during regular trading is included. Normal trades are identified in TAQ data by sale conditions "blank, @, E, F, I, S, Y" which correspond to regular trades, intermarket sweep orders, odd-lot trades, split trades, and yellow flag regular trades. The remaining share volume was aggregated by exchange, and the table denotes exchange type (maker-taker, inverted, flat, free). Share and dollar volume from exchange codes T and Q were combined into 'Nasdaq.' Panel A presents share volume totals and Panel B presents dollar volume totals. Certain items in Table 5 may also be affected by the MDI Rules once they are fully implemented. See infra section VII.C.3.

Transaction fees for trades in stocks priced equal to or greater than $1.00 are generally levied per share transacted. From Table 5 we see that in 2023, there were approximately 2 trillion shares transacted at prices equal to or greater than $1.00 per share across all venues, 57% of which (1.16 trillion shares) were executed on a registered exchange.[1111] Of these on-exchange transactions priced equal to or greater than $1.00 per share, approximately 78% were in stocks with quoted spreads of $0.015 or less.[1112] These numbers provide the basis for estimating the total amount of access fees and rebates collected and distributed in transactions priced equal to, or greater than, $1.00 per share. For transactions less than $1.00 per share the access fee is generally levied as a percent of the transaction share price. In Panel B we see that in 2023 there was approximately $34 billion transacted on exchanges in shares priced less than $1.00 per share.

1111 2T shares ≈ 1.5T narrow spread shares + 493 billion wider spread shares. Also, off-exchange trading volume has increased in recent years. See, e.g., Jonathan Brogaard & Jing Pan, Dark Pool Trading and Information Acquisition, 35 REV. FIN. STUD. 2625 (2022).

1112 The fourth column of Panel A shows 905.1 billion shares traded on exchanges with a price greater than or equal to $1.00 and a quoted spread of $0.015 or less; the fifth column shows 252.2 billion shares traded on exchanges with a price greater than or equal to $1.00 and a quoted spread over $0.015. The total number of shares traded on exchanges with a price greater than or equal to $1.00 is therefore 1157.3 billion (905.1+252.2), and the fraction of these that a spread of $0.015 or less is 78% (905.1/1157.3).

Panels A and B of Table 6 break down the share and dollar volume statistics presented in Table 5 by venue type: maker-taker, inverted, and flat/free.[1113] The overwhelming majority (over 90%) of both dollar and share exchange trading volume occurs on maker-taker venues. Inverted exchanges capture about 5-7% of dollar and share volume, and the remaining share volume transact on flat/free exchanges.

Table 6: Volume by Exchange Type and Estimated Access Fee/Rebate Estimates 2023[a]

Panel A: Exchange Share Volume By Venue Type

	Price<$1 (Billions)	Price>$1; TWAQS ≤ $0.015 (Billions)	Price>$1; TWAQS > $0.015 (Billions)	% Total
Maker-Taker	106.2	832.4	237.9	92.7%
Inverted	6.2	71.9	12.4	7.1%
Flat/Free	0.2	0.8	1.8	0.2%

Panel B: Exchange Dollar Volume by Venue Type

	Price<$1 (Billions)	Price>$1; TWAQS ≤ $0.015 (Billions)	Price>$1; TWAQS > $0.015 (Billions)	% Total
Maker-Taker	31.9	31,953.4	24,846.4	93.9%
Inverted	2.2	2,257.4	1,159.8	5.6%
Flat/Free	0.1	41.1	237.6	0.5%

Panel C: Estimated Fees Collected and Rebates Distributed (Billions)

Fees Collected	$3.41
Rebates Distributed	$3.08
Exchange Capture	$0.34

Panel D: Total Estimated Net Fees by Liquidity Type (Billions)

Demander	$2.97
Provider	($2.63)
Exchange Capture	$0.34

[a] Certain items in this Table 6 may also be affected by the amendments in the MDI Rules once they are fully implemented. See infra section VII.C.3.

[1113] Table 6 is constructed using the same methodology as Table 7 of the Proposing Release, supra note 11, at 80314. The only difference is that Table 6 herein uses data for 2023, whereas Table 7 of the Proposing Release used data for the first six months of 2022.

Panel C provides an estimate of the total amount of access fees collected and rebates distributed.[1114] In 2023 there were an estimated $3.41 billion in access fees collected across all exchanges and $3.08 billion in rebates distributed, resulting in a net capture to all exchanges of $340 million.

Panel D of Table 6 provides estimates of the net access fee paid by liquidity demanders and liquidity suppliers.[1115] In 2023 liquidity demanders paid an estimated $2.97 billion in net access fees and liquidity providers received an estimated $2.63 billion in rebates. The difference of $340 million is the exchanges' estimated net capture.

Although not subject to Rule 610(c), because they do not post protected quotes, ATSs also often assess transaction fees.[1116] As of the third quarter of 2023 there were 32 ATSs that

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[1114] These estimates are computed by assuming a 30 mil access fee and 28 mil rebate on all transactions that occur on maker-taker or inverted exchanges and a 10 mil access fee (and 4 mil rebate) on the volume priced equal to, or greater than, $1.00 per share that occurs on IEX. For trading in sub $1.00 transactions, the various access fees and rebates for each exchange presented in Panel B of Table 4 are multiplied by the corresponding dollar volume of trade in transactions priced less than $1.00 per share to compute the total access fees collected and rebates distributed for this volume. The figures are summed together to provide the estimates of total access fees collected and rebates distributed.

[1115] This estimate presumes that for shares transacted in prices equal to or greater than $1.00 per share on maker-taker venues the liquidity demander pays a 30 mil access fee and the liquidity provider receives a 28 mil rebate. On inverted exchanges the opposite occurs. On IEX it is presumed that liquidity demanders pay an 8 mil access fee and liquidity providers receive no rebate. For trading in sub $1.00 transactions the various access fees and rebates for liquidity suppliers and demanders are computed by taking the respective fees and rebates for sub $1.00 transactions for each exchange presented in Panel B of Table 4 and multiplying them by the corresponding dollar volume of trade in transactions priced less than $1.00 to compute the total access fees collected and rebates distributed for liquidity-providing and demanding trades. The figures are summed together to provide the estimates of total access fees collected and rebates distributed.

[1116] IntelligentCross ATS, for example, offers matching processes for all NMS stocks eligible for trading, and disseminates bids and offers in real-time to subscribers to the ATS's proprietary data feed, but these are not protected quotes. See IntelligentCross, Form ATS-N, Item 15 (Display) (dated Apr. 11, 2022) available at https://www.sec.gov/Archives/edgar/data/1708826/000170882622000002/xslATS-N_X01/primary_doc.xml.

reported trading volume to FINRA transacting a total of 73 billion shares.[1117] Unlike exchanges, the fees that ATSs charge generally do not have a standard structure and are often negotiated between the ATS and the customer. Based on a review of item 19 in form ATS-N, ATSs generally do not provide rebates, and when transaction fees are explicitly discussed, they are often in the range of 10 mils.[1118]

Table 4 indicates that many exchanges charge the maximum allowed fee, rebating nearly all of it as a compensation for liquidity provision. One commenter states, "access fees have been uniquely impervious to market forces."[1119] Rule 611 generally causes marketable orders to be routed to those markets displaying the best-priced quotations.[1120] As discussed in section VII.B.3, a liquidity provider is generally indifferent between receiving compensation in the form of a rebate or in the form of a quoted spread, implying that an exchange can use rebates to induce quoting lower spreads, and hence the best prices.[1121] The exchange can fund the rebate with an

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1117 See FINRA, ATS Transparency Data Quarterly Statistics, available at https://www.finra.org/filing-reporting/otc-transparency/ats-quarterly-statistics.

1118 See infra note 1442 for commenter discussion on ATS transaction fees. See also IEX Letter VI at 5 for additional analysis supporting the conclusion that 10 mils is a representative transaction fee among ATSs.

1119 See IEX letter V at 2, 3. See also Proposing Release, supra note 11, at 80305.

1120 More specifically, Rule 611 requires trading centers to have policies and procedures that reasonably prevent trade-throughs. See Proposing Release, supra note 11, at 80286. A trade-through is a trade that executes at a price lower than a protected bid or higher than a protected offer. The NBBO is set by the best protected bid and offer; therefore, a trade that executes outside the NBBO is a "trade-through." If an exchange does not have a limit order at the best quote, then it cannot execute against an incoming marketable order; rather the exchange would generally need to cancel the order or route it to another exchange with the best quote. The routing of marketable orders is prevalent. A recently published academic article finds that 34% of market orders sent to the NYSE in 2010-11 are routed. See Sida Li et.al., Refusing the Best Price? 2 J. FIN. ECON. 147 (February 2023). For example, suppose two liquidity providers want to sell a share in exchange for $10.002, net of fees and rebates. Suppose the first seller posts at exchange X, which offers a 30mil rebate, while the second seller posts at exchange Y, which offers a 10mil rebate. The seller on exchange X is willing to quote at $10.00 to receive a net price of $10.003, while the seller on Y is not willing to quote at $10.00 because the net price would be only $10.001—the seller on Y must quote at $10.01. Rule 611 will therefore direct marketable orders to the lower quoted price at exchange X.

1121 See Proposing Release, supra note 11, at 80305 ("the NBBO restricts the routing behavior of marketable orders and often forces liquidity demanders to pay the access fee to trade against a NBBO order. Exchanges

access fee charged to the liquidity demander, relying on Rule 611 to reduce the loss of liquidity demanding customers that would otherwise occur from such an increase in prices.[1122] The exchanges profit from the difference between the access fees collected and the rebates paid. Were exchanges to unilaterally lower their access fees and rebates (without other exchanges making similar changes), liquidity providers would likely route their orders to another exchange.[1123] Notably, research surrounding a Nasdaq experiment where it unilaterally lowered fees and rebates found that Nasdaq lost market share to other maker-taker venues with a higher rebate.[1124] Table 4 also shows that even the maximum rebates are close to the access fees; doing otherwise would likely be unprofitable or risky.[1125]

As discussed in the Proposing Release, and as Table 4 shows, the NYSE, Nasdaq, and Cboe exchange families each operate both a maker-taker venue as well as an inverted venue,[1126] Commenters state that inverted venues can be used to achieve intra-tick pricing.[1127] Specifically,

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are thus incentivized to attract more competitively priced liquidity with large rebates, which are funded by similarly large access fees, in order to capture more trading volume"). The high rebate allows the liquidity supplier to offer a better quoted price—i.e., a higher bid or a lower offer—because the liquidity supplier only cares about the total proceeds from the sale (the liquidity supplier does not care whether the proceeds take the form of a rebate).

1122 That is, the need to execute against the protected quote first, before executing at other prices, would maintain a strong incentive for broker-dealers to route orders to the exchange, even in the face of high access fees.

1123 See Proposing Release, supra note 11, at 80305 n.457.

1124 See id.; see also Yiping Lin, et al., A Model of Maker-Taker Fees and Quasi-Natural Experimental Evidence (working paper Feb. 8, 2021), available at https://ssrn.com/abstract=3279712 (retrieved from SSRN Elsevier database). Consequently, it could be harmful to an exchange to unilaterally reduce access fees and their associated rebates if other exchanges do not follow suit. Further, even if each of the exchanges lowered its fees, there would be the risk that a new exchange would see the opportunity and enter the market with high fees and rebates and thus capture market share, inducing the other exchanges to abandon their low fee models to remain competitive.

1125 See discussion in section VII.D.2.b.

1126 See Proposing Release, supra note 11, at 80313.

1127 See Larry Harris, Quarter Penny Tick (working paper, Mar. 9, 2022) attached to Letter from Larry Harris ("Quarter Penny Tick").

the net price of a trade is the quoted price adjusted for exchange fees and rebates; the quoted price is constrained by the tick, but the net price can be between ticks.[1128] To the extent that intra-tick pricing on inverted venues is a solution to the quoted price being constrained by the tick, it is a costly one. First, quote protection applies to the quoted bid or ask, not the net cost, implying that routing a market order to an inverted venue runs the risk of the order being routed elsewhere if the inverted venue is not at the NBBO. Research shows that inverted venues are less likely to be at the NBBO, a result that follows from revenue from rebates and from spreads being interchangeable assuming the market participant receives both.[1129] As explained in section VII.D.1.b.ii, this leads to delays and increased cost.

Second, the existence of inverted venues fragments liquidity compared to the situation where an exchange is able to offer orders to be placed at multiple prices within the quoted spread. One commenter agreed when discussing inverted venues, stating that: "different exchanges are optimal to use for different prices within the penny, which is a recipe for artificial fragmentation, a confusing paper trail, and overall excess complexity. Excess complexity, in turn, is a recipe for excess rents, agency conflict and distrust."[1130]

Lastly, one commenter stated that exchanges could circumvent barriers associated with the tick size and access fees through innovation, such as new order types.[1131] The commenter

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1128 Suppose an exchange family operates both a maker-taker venue and an inverted venue; further suppose that the maker-taker venue offers a 30mil rebate to liquidity suppliers, while the inverted venue charges a 30mil fee to liquidity suppliers. Liquidity suppliers would therefore be able to transact at two different net prices within the tick—e.g., the liquidity supplier could offer to sell at $10.00 on the maker-taker venue, which would result in a net price of $10.003; or the liquidity supplier could offer to sell at $10.00 on the inverted venue to net $9.997. The variation in fee schedules across the venues therefore allows for intra-tick pricing. See also supra section VII.C.2.b for a discussion of current state of the fees and rebates and the variation in pricing structure across exchanges.

1129 See IEX Letter I at 14.

1130 See Budish Letter at 4.

1131 See Virtu Letter II at 23.

stated that: "Lastly, if the tick size were really a significant barrier to competition for exchanges, they could innovate solutions to solve for this. For example, exchanges could develop an order type that functions within the current structure (limit order pricing and priority-ranked based on even penny ticks) but where an order could provide sub-penny price improvement if matched to a marketable order from a counterparty that met certain objective conditions (such as being sourced from a retail customer)."[1132] The commenter proceeded to describe a second novel order type that could allow for sub-penny price improvement through reduced access fees for retail investors.[1133] The order types the commenter lists as examples appear to solve for the specific problem of retail investors achieving price improvement on exchange, a solution that already exists through RLPs (though which do not have significant volume).[1134] It is possible that a new order type designed to mitigate this problem might not work as intended. In contrast, allowing for more ticks in certain stocks as the Commission is adopting is a more straightforward and predictable way of achieving the same ends without requiring the need for order types designed to allow for sub-tick executions on exchanges.

3. Round Lots, Odd-Lots, and Market Data Infrastructure

Currently, information on odd-lot quotes inside the NBBO is available only to investors who subscribe to proprietary data feeds, and comprehensive odd-lot information is only available to market participants who subscribe to the proprietary data feeds of all the exchanges. The implementation of the MDI Rules will include odd-lot information inside the NBBO.[1135] The

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1132 See id.

1133 See id.

1134 See supra section VII.C.1.a for further discussion of exchange RLP programs.

1135 See supra section VI.C and section V.E for discussions on the expected time of the implementation of the MDI Rules.

MDI Rules also defined a round lot, which previously had not been defined in a Commission rule. Specifically, the MDI Rules establish a uniform round lot size of 100 shares for stocks priced $250 or less; 40 shares for stocks priced greater than $250 and less than or equal to $1,000; 10 shares for stocks priced greater than $1,000 and less than or equal to $10,000; finally, 1 share for stocks priced greater than $10,000. These amendments modify the round lot definitions set by the MDI Rules by changing the evaluation period in which a stock's share price is measured. The MDI Adopting Release defined round lots based on the stock's average price in the preceding month—i.e., a stock's round lot was updated every month based on the most recent month's data. These amendments update round lots every six months, with the round lot determined by the stock's average price with a one-month lag—i.e., a stock's round lot is updated in May of every year using its average stock price in March, and the round lot is updated again in November using its average stock price in September.

In the MDI Adopting Release, the Commission established a transition period for the implementation of the MDI Rules.[1136] The Commission's approval of the MDI Plan Amendments will be the starting point for the rest of the MDI implementation schedule.[1137] After approval of the MDI Plan Amendments, the next step will be a 180-day development period, during which competing consolidators can register with the Commission.[1138] Based on the times provided in the transition plan for implementation of the MDI Rules, the Commission estimated

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1136 See MDI Adopting Release, supra note 10, at 18698-18701.

1137 See id. at 18698.

1138 See id. at 18699-18700.

that the full implementation of the MDI Rules will be at least two years after the Commission's approval of the plan amendment(s) required by Rule 614(e).[1139]

The Operating Committees of the CTA/CQ Plan and UTP Plan filed the MDI Plan Amendments on November 5, 2021.[1140] The Commission disapproved the proposed amendments on September 21, 2022.[1141] As a result, the participants to the effective national market system plan(s) will need to develop and file new proposed amendments as required by Rule 614(e),[1142] before the implementation period prescribed by the phased transition plan can commence. Because the implementation of the MDI Rules has been delayed, the end date of the implementation period cannot be estimated with certainty.

The following discussion reflects the Commission's assessment of the anticipated economic effects of the MDI Rules described in the MDI Adopting Release as they relate to the baseline for the adoption of these amendments.[1143] The MDI Rules are part of the regulatory baseline for this rule because they have been adopted. Given that the MDI Rules have not yet been implemented, they have not affected market practice and therefore data that would be required for a quantitative analysis of a baseline that includes the effects of the MDI Rules is not

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1139 See id. at 18700-18701.

1140 The Operating Committees of CTA Plan and UTP Plan filed proposed amendments on Nov. 5, 2021, which were published for comment in the Federal Register. See Securities Exchange Act Release Nos. 93615 (Nov. 19, 2021), 86 FR 67800 (Nov. 29, 2021); 93625 (Nov. 19, 2021), 86 FR 67517 (Nov. 26, 2021); 93620 (Nov. 19, 2021), 86 FR 67541 (Nov. 26, 2021); 93618 (Nov. 19, 2021), 86 FR 67562 (Nov. 26, 2021).

1141 See Securities Exchange Act Release Nos. 95848 (Sept. 21, 2022), 87 FR 58544 (Sept. 27, 2022); 95849 (Sept. 21, 2022), 87 FR 58592 (Sept. 27, 2022); 95850 (Sept. 21, 2022), 87 FR 58560 (Sept. 27, 2022); 95851 (Sept. 21, 2022), 87 FR 58613 (Sept. 27, 2022).

1142 The Commission ordered the exchanges and FINRA to file a new plan regarding consolidated market data on Sept. 1, 2023. On Jan. 19, 2024, the Commission published notice of filing of a National Market System Plan for Consolidated Equity Market Data. See supra note 78.

1143 See MDI Adopting Release, supra note 10, at 18741-18799.

available. It is possible that the baseline for this rule, and therefore the economic effects relative to the baseline, could be different depending on how the MDI Rules are implemented.[1144]

When adopting the MDI Rules, the Commission enumerated numerous economic effects specifically related to changing the round lot definition and including odd-lot information as a part of core data. For the change in the definition of round lots, these effects included: (1) a mechanically tighter NBBO for higher priced stocks due to the redefinition of the round lot sizes,[1145] (2) increased transparency and better order execution,[1146] and (3) potentially more orders for high priced stocks being routed to exchanges instead of ATSs.[1147] The costs of changing the round lot definition included upgrading systems to account for additional message traffic, and modifying and reprogramming systems.[1148] The Commission also discussed the expected effect that changing the round lot definition will have on other rules and regulations.[1149]

For the inclusion of odd-lot information inside the NBBO in core data,[1150] these effects include reducing information asymmetries between investors who currently have access to odd-lot information through proprietary data feeds and those who do not, leading to better order

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1144 Commission staff will review and study the effects of the amendments adopted herein. See the introduction to section VII.D.

1145 See MDI Adopting Release, supra note 10, at 18743 for the full discussion of the effect of changing the round lot size on the NBBO.

1146 See MDI Adopting Release, supra note 10, at 18744, 18747 for the full discussion of the effect of changing the round lot size on transparency and execution quality.

1147 See MDI Adopting Release, supra note 10, at 18747 for the full discussion of the effect of changing the round lot size on exchange competition and order routing.

1148 See MDI Adopting Release, supra note 10, at 18748 for the full discussion of the expected costs of changing the round lot size.

1149 See MDI Adopting Release, supra note 10, at 18749 for the full discussion of the effect of changing the round lot size on other rules and regulations.

1150 See MDI Adopting Release, supra note 10, at 18753 for the full discussion of the effect of including odd-lot information inside the NBBO in its definition of core data.

execution and price efficiency.[1151] Providing an alternative to proprietary data for some market participants will allow these market participants to reduce data expenses required for trading.[1152] The costs of including odd-lot information inside the NBBO include:[1153] the cost of upgrading existing infrastructure and software to handle the dissemination of additional core data message traffic; the cost to SROs to implement system changes required in order to make regulatory data and other data needed to generate consolidated market data available to competing consolidators; the cost of technological investments market participants might have to make in order to receive the new core message traffic; and the cost to users of proprietary data whose information advantage will dissipate somewhat.[1154]

The MDI Rules do not require the competing consolidators to disseminate odd-lot information. However, the Commission estimated that at least one competing consolidator will disseminate the odd-lot information because the Commission believed that there will be demand for the data.[1155]

4. Affected Entities and Markets

The amendments will affect trading in NMS stocks, particularly either on exchanges that charge high access fees or in stocks with lower quoted spreads, many odd-lots inside the spread, or higher prices. Therefore, the amendments will affect a wide variety of market participants, including national securities exchanges, other trading venues, exclusive SIPs and their data users,

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1151 Id.

1152 Id.

1153 See MDI Adopting Release, supra note 10, at 18759 for the full discussion of the costs associated with expanding core data to include odd-lot information inside the NBBO.

1154 Id.

1155 See MDI Adopting Release, supra note 10, at 18752 n.1945 and surrounding text.

any future competing consolidators, broker-dealers operating order entry and order routing systems, and others who engage in the trading of NMS stocks, including investors.[1156]

There are 16 national securities exchanges on which NMS stocks are traded that will be affected by the amendments. The exchanges compete with each other and other trading venues to attract order flow. Exchanges compete by setting the rules that dictate how orders routed to them interact given the broader requirements of the Exchange Act and rules thereunder. Such rules are coded into the systems of exchanges that match buy and sell orders. Exchanges also compete via their services and fee structures; they differentiate themselves with the access fees they charge or the rebates they pay out for particular order types, as well as their data and connectivity options.[1157] A subset of national securities exchanges, the five listing exchanges, also compete to attract stock listings by setting rules for listing standards for securities. The listing exchanges are also responsible for tracking certain regulatory information regarding their listed stocks.

Other trading venues, including 33 ATSs and 238 other FINRA members, including OTC market makers, also compete with exchanges and each other to attract order flow in NMS stocks and can route orders to the various trading venues. The order flow they attract depends on a number of factors such as fees and price improvement over the NBBO, services such as order display features, segmentation of subscriber order flow and the ability of subscribers to select which category of order flow to interact with, among other aspects of execution quality.

1156 According to the 2022 Survey of Consumer Finances, available at https://www.federalreserve.gov/econres/scfindex.htm?mod=article_inline, out of a total number of households of approximately 131,000,000, 58% invested in equities in some fashion (e.g., held stock directly, invested in a stock mutual fund, etc.). Bd Gov. Fed. Res., Changes in U.S. Family Finances from 2019 to 2022: Evidence from the Survey of Consumer Finances (Oct. 2023) at 19, available at financeshttps://www.federalreserve.gov/publications/files/scf23.pdf.

1157 Exchanges can also facilitate the routing of orders to other exchanges.

Pending the full implementation of the MDI Rules, the market for market data is serviced by the two exclusive SIPs and exchange proprietary feeds. The two exclusive SIPs collect trade, quote, and regulatory data from the 16 exchanges and three trade reporting facilities,[1158] consolidate the data, determine an NBBO, and disseminate those data directly to users or through vendors and broker-dealers. The exclusive SIPs can also collect information from the alternative display facility ("ADF") operated by FINRA, though no one currently uses the ADF to display quotes. Upon full implementation of the MDI Rules, the exclusive SIPs will be retired, and an unknown number of competing consolidators will take over the collection, consolidation, estimation, and dissemination of these data.[1159] The volume of data to be processed through these competing consolidators will be greater than that currently processed through exclusive SIPs, but competing consolidators will have flexibility to design data products tailored to different user types. In addition to the exclusive SIPs, the exchanges also disseminate market data to paying subscribers via proprietary data feeds. Some of these proprietary data feeds provide more data than the exclusive SIPs and are provided at a lower latency; however, the proprietary feeds are limited to individual exchanges while the SIPs contain consolidated data across all exchanges and also contain all off-exchange trades.[1160] Following the transition to a competing consolidator

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1158 Trade Reporting Facilities (TRFs) are facilities through which FINRA members report off-exchange transactions in NMS stocks, as defined in SEC Rule 600(b)(47) of Regulation NMS.

1159 While the Commission is uncertain about the number of competing consolidators that will enter the market when exclusive the SIPs are retired, the Commission believes that the most likely outcome is three or more competing consolidators with at least one competing consolidator that is not affiliated with one of the exchanges currently operating the exclusive SIPs or an exchange that has sufficient proprietary data revenue that would create conflicting profit incentives. See MDI Adopting Release, supra note 10, at 18768-72 for further discussion on the number of competing consolidators that may enter the market.

1160 See supra note 862 and infra note 1780 and associated text for a further discussion on the nature of proprietary data feeds.

model for market data, the Commission expects total fees for market data are likely to decline.[1161]

Broker-dealers typically route their own orders or their customers' orders for execution to trading venues. There were 3,494 registered broker-dealers as of Q2 2023.[1162] A portion of these broker-dealers focus their business on individual and/or institutional investors in the market for NMS stocks. According to CAT data, as of the end of 2022, there were approximately 1,006 registered broker-dealers that originated NMS stock orders on behalf of individual investors and approximately 837 broker-dealers that originated NMS stocks orders on behalf of institutional investors.[1163] Institutional investor orders are typically "not held" orders, which provides the broker-dealer with more time and price discretion to execute the order or to minimize price impact.[1164] In contrast, broker-dealers must attempt to execute a marketable held order immediately; these orders better suit retail investors because retail orders typically have much lower price impact, which reduces the need for discretion in order handling.[1165] Brokers-dealers

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1161 See MDI Adopting Release, supra note 10, at 18772-78.

1162 Based on information from broker-dealers' Q2 2023 FOCUS Report Form X-17A-5 Schedule I. This includes both carrying broker-dealers, who maintain custody of customer funds and securities, and introducing broker-dealers, who accept customer orders and introduce their customers to a carrying broker-dealer that will hold the customers' securities and cash. In addition, the Commission acknowledges that the total number of broker-dealers is likely to increase as a result of the recent Dealer Adopting Release. The Dealer Adopting Release adopted new rules to further define the phrase "as a part of a regular business" as used in the statutory definitions of "dealer" and "government securities dealer." The Dealer Adopting Release estimated that up to 43 entities may be required to register with the Commission as a dealer or government securities dealer, which would increase the total number of broker-dealers affected by the amendments.

1163 Customer accounts are identified in CAT as accounts belonging to either the "Institutional Customer" account type, defined as accounts that meet the definition in FINRA Rule 4512(c), or the "Individual Customer" account holder type, defined as accounts that do not meet the definition of FINRA Rule 4512(c) and are also not a proprietary account.

1164 See Securities Exchange Act Release No. 84528 (Nov. 2, 2018), 83 FR 58338 (Nov. 19, 2018) (adopting new order handling disclosure requirements) at nn.59-60 and corresponding text.

1165 FINRA's best execution obligation requires that, "A member must make every effort to execute a marketable customer order that it receives fully and promptly." See FINRA Rule 5310 (Best Execution and

serving individual investors often distinguish themselves by the customer service and financial advice they provide and the accessibility and functionality of their trading platforms.

Many broker-dealers that handle customer accounts do not directly access national securities exchanges or ATSs for their orders. They use other broker-dealers to facilitate market access for them through those broker-dealers' order entry systems. The Commission estimates that there are 1,161 broker-dealers with order entry systems that originate orders in NMS stocks in the minimum pricing increments; the amendments to Rule 612 may require changes to these order entry systems.[1166] Of these broker-dealers, an estimated 270 broker-dealers operate smart order routers to facilitate order routing.[1167]

5. Amendments to Rule 605

Several commenters requested the Commission consider interactions between the economic effects of these proposed amendments and the proposed amendments to Rule 605.[1168] The amendments to Rule 605 were not included as part of the baseline in the Proposing Release because they were not adopted at that time. The Commission amended Rule 605 on March 6, 2024,[1169] and the requirements of that rule are part of the baseline considered here. With certain exceptions, the amendments to Rule 605 have a compliance date of Dec. 14, 2025,[1170] which is

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Interpositioning), Supplementary Material para. .01, available at https://www.finra.org/rules-guidance/rulebooks/finra-rules/5310 (accessed Jun. 18, 2024).

1166 See infra note 1656.

1167 See infra note 1660.

1168 See, e.g., SIFMA Letter II; Virtu Letter II; Citadel Letter I; Equity Market Structure Citadel Letter; Citadel Letter II. See also Rule 605 Proposal, supra note 117.

1169 See Rule 605 Amendments, supra note 10.

1170 See supra note 1044. As an exception, after odd-lot order information sufficient to calculate best available displayed price is made available pursuant to an effective NMS plan, market centers, brokers and dealers will have six months to begin including price improvement statistics relative to best available displayed price in their Rule 605 reports. See Rule 605 Amendments, supra note 10, at 26497.

after the compliance dates of the amendments made by this adopting release. The following discussion reflects the Commission's assessment of the anticipated economic effects of the amendments to Rule 605 described in the Rule 605 Amendments as they relate to the baseline for the adoption of these amendments. Specific interactions between the expected economic effects of the amendments to Rule 605 and those of rules adopted herein will be discussed in detail in a later section.[1171]

Rule 605 requires disclosures for order executions in NMS stocks.[1172] The Rule 605 amendments modified reporting requirements in several ways. First, the amendments expanded the scope of reporting entities subject to the rule to include larger-broker-dealers[1173] in addition to market centers.[1174] The amendments also enhanced the accessibility of the reported execution quality statistics by requiring all reporting entities to make a summary report available.[1175]

The Rule 605 Amendments also included amendments to the information required to be reported under Rule 605, some of which are expected to be relevant to the amendments to this Rule. First, the amendments to Rule 605 added requirements related to the reporting of price improvement statistics relative to the best available displayed price, which incorporates information about the best priced odd-lot orders, in addition to the preexisting requirement to

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1171 See infra section VII.E.6.a; see also supra section II.

1172 17 CFR 242.605.

1173 The term "larger broker-dealer" refers to a broker-dealer that meets or exceeds the "customer account threshold," as defined in Rule 605(a)(7) as broker-dealers that carry or introduce orders on behalf of 100,000 or more customer accounts through which transactions are affected for the purchase sale of NMS stocks. See Rule 605 Amendments, supra note 10, at 26428 n.61; 17 CFR 242.605(a)(7).

1174 Regulation NMS defines the term "market center" to mean any exchange market maker, OTC market maker, ATS, national securities exchange, or national securities association. See 17 CFR 242.600(b)(55).

1175 See Rule 605 Amendments, supra note 10, at 26428.

report price improvement statistics relative to the NBBO.[1176] The Rule 605 Amendments acknowledged that, while under the MDI Rules odd-lot information will include pricing information about odd-lots priced better than the NBBO,[1177] the MDI Rules have been approved but not yet implemented, and thus this information is not yet available. Therefore, the Commission stated that Rule 605's price improvement statistics that are relative to the best available displayed price will not be required to be reported until six months after odd-lot order information needed to calculate the best available displayed price is made available pursuant to an effective national market system plan.[1178]

Second, the amendments to Rule 605 require the separate reporting of non-marketable limit orders that are priced at the midpoint of the NBBO or better ("midpoint-or-better NMLOs"), and additionally requires the reporting of information about the price improvement offered to these orders.[1179] An analysis by the Commission in the Rule 605 Amendments indicates that a high percentage of midpoint-or-better NMLO share volume is submitted with

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1176 See 17 CFR 242.600(b)(14) (defining the "best available displayed price" as, with respect to an order to buy, the lower of: the national best offer at the time of order receipt or the price of the best odd-lot order to sell at the time of order receipt as disseminated pursuant to an effective transaction reporting plan or effective national market system plan; and, with respect to an order to sell, the higher of: the national best bid at the time of order receipt or the price of the best odd-lot order to buy at the time of order receipt as disseminated pursuant to an effective transaction reporting plan or effective national market system plan. With respect to a midpoint-or-better limit order, the best available displayed price shall be determined at the time such order becomes executable rather than the time of order receipt) and 17 CFR 242.605(a)(1)(ii)(M) – (Q).

1177 See MDI Adopting Release, supra note 10, at 18753.

1178 In the Rule 605 Amendments, the Commission acknowledged that it was still considering the proposed changes discussed in the Proposing Release and adopted herein, including accelerating the implementation of the round lot and odd-lot information definitions contained in the MDI Release and amending the definition of odd-lot information to include a new data element for the best available odd-lot orders available in the market. In the Rule 605 Amendments the Commission stated that, if it determined to adopt an amendment to the definition of odd-lot information to include a data element that identifies the best odd-lot orders available in the market, reporting entities would be required to use such information to determine the best available odd-lot price. See Rule 605 Amendments, supra note 10, at 26428 n.719.

1179 See 17 CFR 242.600(b)(57) (defining "midpoint-or-better orders") and 17 CFR 242.605(a)(1)(ii).

IOC designations as compared to other NMLOs, confirming that many of these orders are submitted by traders with the intention of executing immediately against hidden or odd-lot inside-the-quote liquidity, and that these orders tend to have different execution characteristics than other types of NMLOs.[1180] Therefore, the Commission stated that market participants will benefit from an increase in transparency by the separate reporting of these orders, along with the required reporting of certain execution quality statistics that measure the cost of executing immediately, such as effective spreads.[1181]

Third, the amendments to Rule 605 require the reporting of information regarding the extent to which orders received an execution at prices at or better than the quote for share quantities greater than the displayed size at the quote, i.e., "size improvement." This information includes (1) a benchmark metric that measures the displayed size at the time of order receipt, which can then be compared to the number of submitted shares to determine the extent to which a trading venue handled orders that outsized available displayed depth,[1182] and (2) for orders that outsized available displayed depth, the number of shares that received size improvement.[1183]

The amendments to Rule 605 also modified the definition of order size categories from order size categories based on numbers of shares, with orders less than 100 shares excluded, to order size categories based on a notional dollar value range, along with an indication that the

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1180 See Rule 605 Amendments, supra note 10, at 26528.

1181 See Rule 605 Amendments, supra note 10, at 26556-26557, 26568.

1182 See CFR 242.600(b)(72) (defining the "order size benchmark") and 17 CFR 242.605(a)(1)(ii)(R).

1183 See 17 CFR 242.605(a)(1)(ii)(S), requiring the reporting of "the sum of, for each execution of a covered order, the greater of: the total number of shares executed with price improvement plus the total number of shares executed at the quote minus the order size benchmark, or zero." The "total number of shares executed with price improvement plus the total number of shares executed at the quote minus the order size benchmark" ("net size improvement") will only be a strictly positive number for those orders that are both eligible to receive size improvement and actually receive size improvement, and thus is equivalent to a measure of shares that are eligible to and that received size improvement. See Rule 605 Amendments, supra note 10, at 26428 n.1544.

category reflects orders that were for an odd-lot, a round lot, or less than a share.[1184] The Commission stated in the Rule 605 Amendments that one of the benefits of this change is to ensure that round lots for stocks with prices greater than $250 are not excluded from Rule 605 reports following the change in round lot definition under the MDI Rules.[1185]

In the Rule 605 Amendments, the Commission stated that the amendments to Rule 605 will promote increased transparency of order execution quality, particularly for larger broker-dealers who were not required to disclose execution quality information under preexisting Rule 605, but also for market centers, whose execution quality information will be more relevant and easier to access because of improvements to existing Rule 605 disclosure requirements.[1186] The Commission stated in the Rule 605 Amendments that this increase in transparency is expected to increase the extent to which market centers and broker-dealers compete on the basis of execution quality, as well as improvements in execution quality.[1187] The Commission also stated that the amendments to Rule 605 will result in initial and ongoing compliance costs, the majority of which will be related to expanding the scope of reporting entities to include larger broker-dealers, but a significant portion of which will result from the need for market centers to update their systems to process and store the data necessary to prepare the amended reports.[1188]

D. Benefits, Costs, and Other Economic Effects

The Commission expects the adopted minimum quoting increment will alleviate tick constraints and better allow prices to be determined by the forces of supply and demand,

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1184 See 17 CFR 242.600(b)(18).

1185 See Rule 605 Amendments, supra note 10, at 26523.

1186 Id. at 26543.

1187 See Rule 605 Amendments, supra note 10, at 26543-26544.

1188 Id. at 26579-26580.

lowering transaction costs for investors. A lower access fee cap will further reduce the transaction costs of liquidity demanders in the predominant maker-taker structure. Making fees and rebates determinable at the time of trade may enhance broker-dealer order routing by helping mitigate a potential conflict of interest and providing clarity in terms of all in execution costs. Accelerating the inclusion of odd-lot information into the exclusive SIPs, accelerating the implementation of the round lot definitions, and amending the definition of odd-lot information to include the best odd-lot order, will accelerate some of the benefits of the MDI Rules, and could also lead to better order execution by enhancing benchmarking. The amendments will also impose compliance costs on various market participants.

The Commission continually monitors the national market system and the operation of federal securities laws. As discussed above, the national market system continually changes and the Commission, consistent with its oversight of the national market system, will monitor the impact of the adopted rules. With regard to the amendments adopted herein, by May 2029 (three years from the last implementation date), Commission staff will review and study the effects of the amendments in the national market system. Such a review and study might include, but would not be limited to, an investigation of: (i) general market quality and trading activity in reaction to the implementation of the variable tick size, (ii) the reaction of quoted spreads to the implementation of the amended access fee cap, and (iii) changes to where market participants direct order flow, e.g., to exchange versus off-exchange venues, following the implementation of the amendments.

In studying the effect on market quality, a number of different metrics could be examined including quoted, realized, and effective spreads; cumulative depth from the midpoint across

multiple price levels; and the cost of a round-trip trade for various trade sizes.[1189] In such analysis, improvements in market quality for stocks affected by Rule 612 would correspond to reduced spreads (adjusting for fees or rebates) or a reduced cost of a round-trip trade.[1190] To isolate the effect of Rule 610, the analysis might focus on those stocks not directly affected by Rule 612. Such analysis might focus on the effect of Rule 610 on quoted spreads (e.g., to examine how the quoted spread adjusts in response to changes in fees and rebates), on whether Rule 610 leads to any change in effective spread off-exchange (due to adjustments to on-exchange quotes), and on any migration of liquidity off-exchange.

1. Modification of Rule 612 to Create a Half-Penny Tick

The Commission is adopting amendments to Rule 612 that introduce one minimum pricing increment that is less than $0.01, i.e., $0.005, for quotes and orders priced $1.00 or more for NMS stocks that have a TWAQS of $0.015 or less during the evaluation period.[1191] Hence, the amendments to Rule 612 will create a smaller tick size for some NMS stocks.

The Commission expects that, on average, market quality will improve for the stocks receiving the smaller tick size. A smaller tick has two competing effects on market quality. First, a smaller tick leads to pricing that more effectively balances liquidity supply and demand, limiting distortions, and thus lowering transaction costs. Second, a smaller tick fragments liquidity in the order book into more price levels, which can increase complexity associated with implementing trades, and increases the incidence of pennying[1192] – effects that can harm

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1189 *Compare* Table 8.

1190 One possible study design could focus on stocks close to the TWAQS threshold. Comparing stocks with similar levels of liquidity ex ante would better isolate the effect of the smaller tick size on market quality.

1191 See infra section III.C

1192 See supra section I.A.1 and note 994 for the definition and discussion of pennying.

liquidity. A smaller tick can also increase message traffic which can be costly for market participants. The amendments will not change the tick for NMS stocks priced below $1.00, nor for stocks with time-weighted average quoted spread always greater than $0.015 during an Evaluation Period and thus the tick size amendments are expected to have minimal if any effect on the trading environment for these stocks.

a. Estimates of Percent of Trading Volume and Number of NMS Stocks Affected

As discussed in section VII.C.1, prior to these amendments, the tick size for orders in NMS stocks priced equal to or greater than $1.00 was $0.01, and the tick size for orders in NMS stocks priced less than $1.00 was and remains $0.0001.[1193] The amendments assign each NMS stock to one of two tick sizes: $0.005 or $0.01, depending on the stock's time-weighted average quoted spread during an Evaluation Period (specifically, assigning $0.005 for stocks with a TWAQS of $0.015 or less).[1194] Table 7 presents estimates of the amount of share and dollar trading volume that would have been associated with the two tick sizes, as well as the sub $1.00 tick size, based on 2023 trading volumes. It also presents estimates based on the Proposal which would have reduced tick sizes for stocks with TWAQS of $0.040 or less.

Table 7: Estimated Number of Stocks and Trading Volume in Each Tick Size Group[a]

Average Quoted Spread	Tick	Number of Stocks	Estimated % Share Volume	Estimated % Dollar Volume
All Stocks				
Spread <= $0.015	$0.005	1,788	66.2%	42.9%
$0.015 < Spread	$0.01	9,047	33.8%	57.1%

[1193] See supra section VII.C.1.a.

[1194] See supra section III.C for further discussion.

Spread <= $0.04	(Proposed Reduction to $0.005 or smaller)	4,333	84.8%	66.5%
Price < $1:				
	$0.0001	1,106	12.3%	0.1%

[a] In this table, quoted spreads, and thus tick sizes, are determined by computing the time-weighted quoted spread during regular trading hours as computed by the WRDS intra-day indicators for every sym_root and sym_suffix combination in the WRDS intra-day indicators dataset and taking the equal weighted average across all trading days in January - March 2023. Stocks with average quoted spreads less than $0.015 are assigned a $0.005 tick. All other stocks are assigned a $0.01 tick. A stock with a price less than $1.00 will still be assigned a tick size per the usual process, which would be in force should the stock's price rise above $1.00. As long as the stock's price remains below $1.00 the $0.0001 tick size would prevail. The designated tick size is applied to trading volume in in May – October 2023 where share and dollar volume is obtained from the universe of stocks in WRDS intra-day indicators. New stocks are given a tick size of $0.01. The number of stocks assigned to each group is indicated in the *Number of Stocks* column and indicates the average number of stocks in each category (listings and de-listings can affect the daily number of stocks trading as well as if a stock's price falls below $1). If a stock has a VWAP of less than $1.00, then that stock, as well as all of its trading volume for that day, is assigned to the $0.0001 tick size.

This estimate may be an upper bound. As discussed in section VII.B.3, supra and infra section VII.D.2, rebates can lower the quoted spread (although not necessarily transaction costs). Thus, lowering the access fee, and thus the associated rebates, may lead to wider quoted spreads. Because of this, some stocks may have quoted spreads that meet the threshold for the smaller tick size in the current environment but may not meet that threshold once the access fee cap is reduced, leading to lower rebates offered. Additionally, all stocks, even those priced below $1.00, will be assigned a tick size via the usual process. If a stock price falls below $1.00 the applicable tick size will be $0.0001. So not all stocks initially assigned the $0.005 tick size will trade differently than the baseline. This table differs from Table 3 because Table 3 is based on daily average TWAQs and does not attempt to analyze the effect of the adopted amendments.

Once implemented, the changes to the current arrangements for consolidated market data pursuant to the MDI Rules may impact the number of stocks and their estimated percentage volumes anticipated for each tick level. In particular, under the MDI Rules, NMS stocks priced $250 or more will receive reductions in round lot sizes which is anticipated to lower their quoted spreads; however, the effect on the reported numbers is likely small both because these stocks make up less than 4% of share volume and because they are unlikely to have quoted spreads less than $0.015. Based on an analysis of data from May-October 2023, the average quoted spread of a stock priced between

$250 and $1,000 was $0.71, far greater from the $0.015 that will trigger a smaller minimum increment. Similarly, for stocks priced between $1,000 and $10,000 the average quoted spread was $3.85 and the only stock that had a value weighted average price greater than $10,000 already has a round lot size of one share and had an average quoted spread of $0.07.

Table 7 indicates that, had the amendments been in place in 2023, approximately 66% of share volume and 43% of dollar volume, associated with an estimated 1,788 individual stocks, would likely have been assigned the $0.005 tick size. The adopted Rules represent a significant reduction in the scope of the Rule compared to the proposal. Table 7 provides estimates of the number of stocks and volume that would have been affected if the Commission had implemented the Rule with the tick size thresholds as proposed (the proposal would have lowered the tick size for all stocks with TWAQS less than $0.04). The Commission estimates that there would have been 4,333 stocks receiving a smaller tick accounting for 84.8% (66.5%) of share (dollar) volume if all stocks with a TWAQS less than or equal to $0.04 received a smaller tick size. Consequently, the number of stocks receiving a lower tick size is more than halved under the adopted amendments.

b. Effects on Market Quality

For the stocks that will receive the $0.005 tick, the Commission expects market quality to improve. Smaller tick sizes present a market quality tradeoff between increasing pennying and complexity concerns – which can harm market quality – and reducing pricing constraints – which can improve market quality by reducing pricing distortions leading to an oversupply of liquidity relative to competitive levels. The Commission believes that market quality will, on average, improve for stocks receiving the smaller tick based on theoretical discussion, the Commission's empirical analysis, as well as evidence and opinions expressed by commenters.

For example, one commenter agreed with the presence of market distortions under current tick sizes, stating: "[t]he SEC correctly describes the problem of tick-constrained securities. Such securities are 'not able to be priced by market forces' because the current 'rule 612 minimum pricing increment of $0.01 may now be too large for certain stocks, which, in turn, results in the pricing of such stocks being artificially constrained.' Trading in these securities would be improved 'if competitive market forces could establish prices in sub-penny increments, which could reduce quoted spreads,' allowing these securities to 'be priced more aggressively within the spread.'"[1195]

The theoretical discussion provided below supports characterizing a smaller tick size as providing a pennying/complexity versus pricing constraint tradeoff, and the empirical analysis presented in Table 8 as well as other empirical research suggests that, for stocks with fewer than approximately two ticks intra-spread,[1196] a reduction in the tick size on average improves market quality. A number of commenters agreed, and some commenters presented analyses suggesting that 2 to 4 ticks intra-spread may be optimal. Combined, this evidence suggests that the tick size reduction associated with these amendments will, on average, improve market quality for the subset of stocks receiving the lower tick size.[1197]

1195 See Nasdaq Letter I at 11 (quoting the Proposing Release).

1196 We use the terminology "ticks intra-spread" or "ticks within the spread" to mean the number of quoting increments between the NBB and NBO (the quoted spread). For example, if the quoted spread is one penny wide (in a stock priced above $1), then we say that there is one tick intra-spread under the baseline. Under the baseline, symbols priced above $1.00 with a quoted spread between 2 and 4 pennies would have 2 to 4 ticks intra-spread.

1197 The amendments will take stocks trading with 1-1.5 ticks intra-spread and increase the number of ticks intra-spread to up to 3.

i. Theoretical Discussion

Tick sizes present an economic tradeoff.[1198] All else equal, reducing the tick size improves market quality by reducing distortions associated with markets not being able to set prices that equate liquidity supply and demand in the presence of a discrete pricing grid.[1199] In a competitive market, and in the absence of rebates or other price distortions, the prevailing bid or ask price will be the feasible price equal to or just worse than the price that equates supply and demand for the underlying asset.[1200] This is because liquidity providers will not post bids and offers that would result in guaranteed trading losses – i.e., they will not post prices that do not bring in sufficient revenue to cover their marginal cost of providing liquidity.[1201] Since there is competition along a finite pricing grid, they choose the closest feasible price just worse than the competitive one. The gap between the feasible price and the price that equates liquidity supply and demand – i.e., the competitive price – is a price distortion allowing liquidity providers to earn rents on liquidity provision.

This pricing distortion is most relevant for stocks that are tick-constrained and diminishes as quoted spreads widen. To understand this, consider again the example of section VII.B.2. In that example, under a tick size of $0.005, the ask would be $10.015 and the bid $10.005. However, with a tick size of $0.01, the ask would be $10.02 and the bid $10.00, implying a

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1198 See section VII.B.2

1199 See, e.g., Rindi and Graziani Letter at 2 (agreeing), see also Barardehi et al., supra note 231 (for a more thorough discussion of this tradeoff). See also NASAA Letter at 9 (stating that the general concept that a narrower tick size will increase pricing efficiency), as well as discussion in Ingrid M. Werner, et al., Tick Size, Trading Strategies and Market Quality, 69 MGMT. SCI. 3818 (2023). See also Budish Letter at 4 referring to a tick size that is too wide as producing rents via regulatory price constraints.

1200 Any price better than this will lead to an excess of liquidity demand which will push prices out again.

1201 Marginal cost in this context refers to the cost of providing an additional share of liquidity. If the revenue associated with providing a share of liquidity is less than the cost of providing that share, then liquidity providers are better off not providing liquidity than incurring a loss to provide liquidity.

spread that is twice as wide. Now assume that the same issuer reduced the number of shares so that the stock increases in price 100-fold, but the underlying economics are the same. To achieve the same reduction in spread would not require any change to the tick size: an ask of $1,001.50 and a bid of $1,000.50 are feasible even with a tick size of one penny.

While a smaller tick size increases competition, thereby reducing distortions and reducing transaction costs, there are potential costs raised in the proposing release and also by commenters which are discussed below.

Pennying: The proposing release and commenters identified pennying as a risk of a smaller tick which can harm market quality.[1202] Pennying occurs when limit order providers get to the front of the queue by providing economically trivial price improvement. It reduces the importance of time priority.[1203] The risk of being pennied could discourage liquidity provision in lit markets, particularly by market participants that are slower to respond to changes in market conditions and could increase transaction costs for these investors.[1204] To compensate for additional costs associated with a fragmented order book, liquidity providers may post less aggressive quotes leading to wider quoted spreads and worse market quality. [1205]

Market participants may respond to an increased risk of pennying by increasing their use of hidden or off-exchange orders that do not display prices, and thus avoid exposing the price

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1202 See, e.g., Robinhood Letter at 41, Virtu Letter II at 4, Tastytrade Letter at 20, AIMA Letter at 2, Brandes Letter at 2, UBS Letter at 10, and TradeStation Letter at 5, Lewis Letter attached to Virtu Letter II at p 33. See also supra note 994 and section VII.B.2 for a definition and discussion of pennying. See also Proposing Release, supra note 11 at section V.D.1.

1203 See, e.g., Antitrust Division of the DOJ Letter at 5 and XTX Markets Letter at 3.

1204 See Dyhrberg et al., supra note 994 studying the effects of imposing a tick size on a crypto exchange that previously did not have a tick size. The authors report an improvement in market quality due largely to a reduction in pennying behavior. See also Virtu Letter II at 25 and Better Markets Letter I at 8. See also Budish Letter at 5.

1205 See, e.g., Virtu Letter II at 8, Fidelity Letter at 10.

needed to beat in order to get to the front of the queue and increase the likelihood of a fill.[1206] Increased use of hidden orders has been associated with worse market quality outcomes.[1207] Some commenters expressed their belief that a narrower tick and increased pennying could lead some orders that previously were at protected prices to be traded through.[1208] However, it is not clear from the commenters' letters why this would occur given the order protection rule and broker's best execution responsibilities. One commenter also suggested that narrow ticks could increase volatility.[1209] However, existing research on the topic would suggest, if anything, an opposite effect.[1210]

In contrast to the tick size pricing distortion discussed above, which is most relevant for stocks that are tick-constrained,[1211] the pennying effect will be most pronounced for stocks with wide quoted spreads because there are more intra-spread price levels and the cost of gaining priority over other liquidity providers, by updating the best price by a single tick, is lower with a smaller tick.[1212] For example, a stock with a quoted spread of ten cents, and a $0.01 tick, will have 10 price levels within the quoted spread, whereas a stock with a $1.00 quoted spread and a

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1206 See, e.g., IEX Letter I at 12, Danny Mulson Letter at 1, Nasdaq Letter I at 2.

1207 See, e.g., Amy K. Edwards, et al., The Effect of Hidden Liquidity: Evidence from an Exogenous Shock (working paper Mar. 1, 2021), available at https://ssrn.com/abstract=3766512 (retrieved from SSRN Elsevier database) ("Edwards, et al. (2021)"). See also Danny Mulson Letter at 3 stating that a smaller tick size would lead to more hidden orders, specifically 'peg offset dark orders' which could harm price efficiency.

1208 See Themis Letter at 5,Virtu Letter II at 6, 10 discussing how a smaller tick can weaken protected quotes.

1209 See, e.g., Virtu Letter II at 8. See, also Edwin Hu et al., 2018; supra note 1002; and Kee H. Chung et al., Tick Size Liquidity for Small and Large Orders and Price Informativeness: Evidence From the Tick Size Pilot Program, 136 J. FIN. ECON. 879 (2020), who both report the opposite effect in the context of the Tick Size Pilot where stocks with wider ticks experienced more volatility.

1210 See id. see also e.g., Edwards, et al., (2021), supra note 1207.

1211 See supra this section.

1212 The pennying effect would be particularly acute for wide-quoted spread stocks with lower stock prices because a lower stock price reduces the amount of capital needed to supply a round-lot quote and hence make pennying less capital intensive.

$0.01 tick will have 100. Because price has first priority in order execution, in a price-time priority system where quote priority is awarded based on best price first and then arrival order second, a primary way to gain priority for a trader providing liquidity is to price-improve over existing orders. Without a small tick size relative to the quoted spread, getting to the front of the queue via price improvement will be more costly, requiring larger relative price concessions.[1213] Because the (beneficial) pricing efficiency effect is greatest when quoted spreads are narrow, whereas the (detrimental) pennying effect is greatest when quoted spreads are wide, this analysis suggests setting a minimum quoting increment on the basis of average spread. Commenters agreed.[1214]

Fragmenting liquidity: The proposing release and commenters also discussed a cost of a lower tick size as spreading the displayed orders over more price levels.[1215] When tick increments are farther apart, all else equal, liquidity providers that may have various prices at which they are willing to provide liquidity must congregate their quotes at only the available quoting increments. Thus, there will be more depth at each level including at the NBBO. With more price levels due to a smaller tick size, market participants can more accurately tailor their quotes to the prices at which they are willing to provide liquidity and thus liquidity will naturally

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[1213] For example, if a stock has a quoted spread of ten cents and a $0.01 tick, gaining priority through price improvement would require narrowing the half- quoted spread (i.e., the distance between the current quote and the midpoint) by 20%. If instead a stock has a quoted spread of $1.00 with a $0.01 tick, a market participant would only need to improve the half-quoted spread by 2% to get to the front of the queue.

[1214] See Budish Letter at 4 and Harris Letter at 7 supporting the use of quoted spread as the determinate of the tick size. See also infra section VII.D.1.b.iii.

[1215] See Proposing Release, supra note 11 at section V.D.1 for a discussion of fragmenting liquidity. See also e.g., GTS Letter at 5 and CCMR Letter at 24.

spread over more levels and there will be fewer resting orders at each price level, including the NBBO.[1216]

Fragmenting liquidity across multiple price levels may decrease costs associated with smaller orders, which would be able to source liquidity at improved prices due to a finer price grid.[1217] However, it can increase the complexity and cost associated with sourcing liquidity for larger orders,[1218] as the reduction in shares available at the top of the book will render it more likely that a market participant must source liquidity beyond the NBBO in order to execute a trade.[1219] It could also increase the number of child orders a parent order needs to be divided into to execute, which could increase the overall complexity and likelihood of information leakage leading to increased transaction costs via increased price impact.[1220]

Quote Instability: Commenters also stated that less depth at the NBBO can lead to increased NBBO quote instability as trades are more likely to deplete depth at the NBBO prices.[1221] One commenter presented evidence that lower quote stability is empirically associated

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1216 See, e.g., GTS Letter at 5, CCMR Letter at 24, and UBS Letter at 11.

1217 See UBS Letter at 11.

1218 Id. See also TradeStation Letter at 6 mentioning as an example of increased complexity that brokers would have to put systems in place to manage customers' good-till-canceled trades that may remain open over a weekend when a tick size change is implemented. See also discussion in Lewis Letter attached to Virtu Letter II at 34-35.

1219 See, e.g., IEX Letter I at 13 discussing how order shredding with smaller ticks can increase information leakage, such as when quotes on other exchanges are cancelled when limit orders on one exchange begin to be executed, potentially signaling a large price moving trade. Brandes Letter at 2 states that increased complexity associated with more pricing increments would be to the detriment of longer-term investors. Equity Market Structure Citadel Letter at 2 states that for institutional investors, "[l]arger orders will be more complex to execute, as filling the entire order will require accessing multiple price levels, which can increase price impact."

1220 See, e.g., Citadel Letter I at 5, 9 and Virtu Letter II at 8, 10 discussing the price impact of large trades under a regime of smaller ticks; stating that smaller ticks could increase price impact.

1221 Some commenters stated that smaller ticks would lead to more "flickering quotes," which are defined in the Reg NMS release as quotes that flashed for a short period of time solely to earn market data revenues, but were not truly accessible and therefore did not add any value to the consolidated quote stream. However,

with increased market making costs, which it states may deter liquidity provision.[1222] While increased quote instability may occur in stocks receiving the lower tick, the lower tick itself will allow market forces to adjust the price of liquidity – i.e., the quoted spread – such that market makers are competitively compensated for the risks associated with providing liquidity. Increased instability in the NBBO could make it more difficult to determine which exchange has the best price at a given point in time and thus where to route an order.[1223] This could be particularly true when markets are volatile.[1224]

Increasing (or decreasing) rents to speed: The Proposing Release stated that "too small ticks may inefficiently award speed".[1225] As discussed in the next few paragraphs, commenters also commented on the effects of tick size on speed. Investments in speed are a fixed and largely irreversible cost that some market participants choose to incur. Changing the tick size could change the profitability of such investments, that is, they could increase or decrease the rents to speed. As noted in section VIII.B.2, a narrower tick reduces rents that accrue when a liquidity provider can be first in line in a queue.[1226] That is, narrowing the tick would be expected to

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the Commission believes that this is unlikely for reasons discussed in the Proposing Release note 195 and surrounding text relating to advances in exchange technology. Other commenters defined 'flickering quotes' more broadly simply as periods of time where the NBBO changes rapidly, see, e.g., IEX Letter I at 8 and Robinhood Letter at 20. Much of the concern these commenters expressed was with respect to the proposed $0.001 and $0.002 tick sizes which are not part of the adopted amendments, see IEX Letter I at 8 and Robinhood Letter at 20. As discussed here, the Commission acknowledges that a smaller tick will likely lead to more frequent changes to the NBBO and discusses those consequences herein.

1222 See IEX Letter I at 11-12.

1223 See, e.g., Themis Letter at 6 and CCMR Letter at 17 and MFA Letter at 1. Quote instability could increase the complexity associated with complying with Rule 611 as it could make it harder to determine which exchange currently has the best price.

1224 See Citadel Letter I at 2, 7.

1225 See Proposing Release, supra note 11, at 80306.

1226 See, e.g., Budish Letter at 1 ("Reducing the tick-size constraint for tick-constrained stocks will reduce excess rents from artificially constrained prices. These excess rents lead to a speed race to the top of the book, which increases complexity, and the rents come at the expense of investors via a higher cost of liquidity."), Antitrust Division of the DOJ Letter at 5, and XTX Markets Letter at 3.

reduce rents to speed. However, speed confers an advantage in implementing a pennying strategy: a trader can not only step ahead of another trader, but also potentially sell (or buy) an asset back to the other trader if the market moves unfavorably, replicating an option-like payoff.[1227] The amendments are limited to stocks with spreads for which pennying is unlikely to be a dominant effect. Nonetheless, to the extent that pennying increases, it has the potential to increase the rents to speed.

In the context of the proposal, one commenter stated that a smaller tick size would be expected to increase the frequency of sniping because smaller ticks generate faster and more frequent price changes.[1228] While there will be more prices at which to trade, the underlying information is not changing (prices may change more rapidly, but the information of each price change is smaller). That is, sniping may become more frequent, but the profits per each individual snipe attempt would decline. However, and as stated above, the Commission does agree that a large number of ticks within the spread can make pennying more prevalent, and to the extent that profits are linked to speed, can increase the rents to speed. The adopted amendments imply fewer ticks intra-spread than the proposing amendments, reducing this effect. Thus, the Commission does not expect slower traders to be disadvantaged by the adopted amendments.

Effect on thinly traded securities: One commenter stated that narrower quoted spreads due to a smaller tick would be harmful for liquidity, particularly for smaller and medium-sized

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[1227] See supra note 993 for a discussion on the relationship between pennying and trading speed. See supra note 1202 and accompanying text for discussions regarding the amendments to Rule 612 and pennying.

[1228] See Virtu Letter II at 23. Sniping pertains to the ability to "pick off", by executing against a stale quote in response to new information before it can be updated.

companies and for thinly-traded securities.[1229] This is because narrower quoted spreads would discourage some liquidity providers from entering the market. The Commission disagrees with this characterization. The academic research on the Tick Size Pilot (TSP), which increased the tick size for some smaller stocks from $0.01 to $0.05 between 2016 and 2018, suggests that for many stocks affected by the TSP, particularly those with narrower quoted spreads, the TSP led to worse market quality.[1230]

Additionally, lowering excess rents and the oversupply of liquidity caused by tick size induced pricing distortions is likely to reduce aggregate depth across all price levels. However, this reduction is unlikely to be harmful to overall market quality, even for smaller or thinly traded securities, as it would relieve a distortion resulting in an oversupply of liquidity. As the amount of liquidity provision comes closer to equilibrium levels, quoted spreads narrow and queue lengths shorten, lowering transaction costs and increasing the likelihood that relatively slower fundamental and/or retail traders could interact with each other. This will reduce total transaction costs for these traders because one side would be earning the quoted spread on the transaction.[1231]

ii. Empirical Analysis

This section presents the Commission's empirical analysis, as well as a discussion of commenter analysis and views concerning the effect of a tick size reduction on various aspects of market quality. Based on these analyses, the Commission concludes that on average, stocks that receive the smaller $0.005 tick size will experience improved market quality – implying that, for

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1229 See STA Letter at 5.

1230 See infra section VII.D.1.b.ii and Barardehi et al., supra note 231 for additional discussion of the tick size literature.

1231 See Retirement Coalition Letter at 2, Pragma Letter at 10.

these affected stocks, the predominant market quality effect of the smaller tick size will be an increase in pricing efficiency.[1232]

The academic literature examining the effect of tick sizes on financial markets largely studies two events: decimalization, which occurred in 2001[1233] and reduced the tick from 1/16th of a dollar ($0.0625) to $0.01; and the TSP, which ran from October 2016 to October 2018 and temporarily increased the minimum tick increment from $0.01 to $0.05 for a sample of small cap stocks.[1234] Most of the literature surrounding decimalization suggests that, on average, decimalization was associated with a decline in quoted spreads consistent with the notion that lowering the tick size relieved distortions related to having a tick size that is too wide.[1235]

In the Proposing Release, the Commission supplemented existing research with its own analysis on the TSP.[1236] As stated in the Proposing Release, market dynamics have changed dramatically in the more than two decades since decimalization. Most notably over that period, electronic, algorithmic, and high-frequency trading have come to dominate the trading landscape,

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1232 See supra note 1199 and surrounding text for additional discussion of the tick size tradeoff.

1233 See, e.g., Order Directing the Exchanges and the National Association of Securities Dealers, Inc. to Submit a Phase-in Plan to Implement Decimal Pricing in Equity Securities and Options; Pursuant to Section 11A(a)(3)(B) of the Securities Exchange Act of 1934, Securities Exchange Act Release No. 42914 (June 8, 2000), 65 FR 38010 (June 19, 2000); Commission Notice: Decimals Implementation Plan for the Equities and Options Markets, SEC (July 24, 2000), available at http://www.sec.gov/rules/other/decimalp.htm.

1234 See Edwin Hu, et al. (2018), supra note 1002, for additional details about the Tick Size Pilot.

1235 See Hendrick Bessembinder, Trade Execution Costs and Market Quality After Decimalization, 38. J. FIN. & QUANTITATIVE ANALYSIS 747 (2003). See also Michael A. Goldstein & Kenneth A. Kavajecz, Eighths, Sixteenths and Market Depth: Changes in Tick Size and Liquidity Provision on the NYSE, 56 J. FIN. ECON. 125 (2000) and Charles M. Jones & Marc L. Lipson, Sixteenths: Direct Evidence on Institutional Execution Costs, 59 J. FIN. ECON. 253 (2001), both examining the earlier tick size change from 1/8 to 1/16 of a dollar. See also Sugato Chakravarty, Venkatesh Panchapagesan & Robert A. Wood, Did Decimalization Hurt Institutional Investors?, 8 J. FIN. MKTS. 400 (Nov. 2005) and Sugato Chakravarty, Bonnie F. Van Ness, & Robert A. Van Ness, The Effect of Decimalization on Trade Size and Adverse Selection Costs, 32 J. BUS. FIN. & ACC. 1063 (June/July 2005), both suggesting that large institutional trades may have become more costly following decimalization.

1236 See Proposing Release, supra note 11, at 80318-80322.

whereas they were much less prominent in 2001. These changes diminish the relevance of evidence from these prior periods, making it desirable to supplement existing studies with evidence that is closer in time [1237]

Some commenters questioned using the TSP to estimate the effects of a reduced minimum pricing impact because the TSP affected only a subset of small cap stocks, did not contain ETPs, and did not affect access fee caps.[1238] One of those commenters suggested that the TSP analysis was not applicable because it focused on stocks with quoted spreads much wider than the few cent quoted spreads contemplated by the amendments.[1239] The same commenter suggested that the TSP was not applicable because it applied to a 5 to 1 tick size change, which is different from the tick size change in the amendments.[1240] Some commenters went further and questioned whether anything could be learned from the TSP because it did not involve subpenny tick sizes.[1241]

As explained in the following discussion, the Commission continues to believe that the TSP provides a meaningful environment to study the potential effects of a tick size change for the reasons articulated below, even as the TSP has limitations for determining the exact effect of the amendments to Rule 612.

1238 See, e.g., CCMR Letter at 27, Virtu Letter II at 64. Lewis Letter attached to Virtu Letter II at 34.

1239 See CCMR Letter at 27.

1240 Id.

1241 See Citadel Letter I at 12 (stating that the TSP "provides no information on what would be expected to occur if minimum quoting increments were further reduced to levels that have never before been tested"); and Virtu Letter II at 3 ("The TSP studied the impact of a widened minimum quoting and trading increment for certain small capitalization stocks, and offered no analysis, data, or conclusions on the potential impact that a narrowed, sub-penny tick regime would have on the marketplace, the investor experience, or issuers. It is an apples-to-oranges comparison and is irrelevant as a basis for support").

First, the economics of being tick-constrained do not depend on the absolute size of the tick in question. Rather, they depend on the relationship between the economic spread[1242] implied by the economics of the stock and the quoted spread that is possible given the tick size, regardless of the specific tick size. Specifically, when the economic spread is narrower than a single tick, the negative effects of being tick-constrained are expected to emerge for the reasons discussed in section VII.D.1.b.i above.[1243] Those reasons are independent of the absolute size of the tick. They instead depend on the ratio of the market price of liquidity to the tick, i.e., the lowest quoted spread permitted by the tick size. In this context, the TSP analysis has merit, even as it includes some stocks with quoted spreads wider than 1.5 cents (the cutoff for the amendments), because its purpose is to gain insight into how stocks with various numbers of tick increments intra-spread react to changing the tick. Addressing this question necessitates considering stocks with wider quoted spreads.

Second, as discussed above, a key factor in the economics of being tick constrained is the implied quoted spread relative to the tick size, not the market capitalization or any other the qualifying factors for the TSP. Because the economics of being tick-constrained do not depend on market capitalization, the findings derived from the TSP can be usefully applied to a broader section of the market. Also, one study,[1244] referenced in the Proposing Release, specifically examined only the most liquid TSP stocks and removed stocks with very low prices.[1245] The authors' results indicate that, in this subset of the most liquid TSP stocks, all key findings of the

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1242 See supra note 990 and surrounding text for discussion of the term economic spread.

1243 See also id. for a discussion of the concept of economic spread.

1244 See Barardehi et al., supra note 231.

1245 See Proposing Release, supra note 11, at 80273 n.85.

TSP not only hold, but that the patterns of the results of the TSP on market outcomes tend to strengthen.

Third, while the Commission acknowledges the difference between the TSP and the amendments with regard to tick size splits – the TSP was a 1:5 tick size change while the amendments provide a 1:2 tick size change for some stocks – the TSP provides meaningful information about the likely direction of the effects due to a tick size change: that is, whether market quality improves or declines when the tick size is changed. The actual effect of a 1:2 split may differ from that observed from the TSP's 1:5 split, but it is unlikely to go in the opposite direction if the TSP were to indicate a market quality improvement when the tick size is reduced. This is because the potential negative effects of too many ticks intra-spread would be stronger for the 1:5 split associated with the TSP than with the 1:2 split associated with the amendments.[1246] Thus, it is unlikely that, were the TSP to show an improvement in market quality associated with a 1:5 tick size split for certain stocks, that there would have been an opposite effect with a 1:2 tick size split.

Some commenters stated that reducing the tick size below $0.01 was opposed to the conclusions and analysis provided by the Commission when adopting Rule 612 in 2005, and that the Commission did not provide analysis explaining why it was reversing its opinion.[1247] The Commission disagrees that the analysis and conclusions associated with the initial proposal and adoption of Rule 612 are inconsistent with the analysis provided in the Proposing Release and

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1246 For example, the potential negative effects from sub-pennying would be higher from a 1:5 split compared to a 1:2 splits because the cost of gaining priority over other liquidity providers, by updating the best price by a single tick, is lower with a smaller tick. The risk liquidity fragmenting across price levels would also be higher with a 1:5 split as compared to a 1:2 split. See supra section VII.D.1.b.i for further discussion.

1247 See, e.g., Equity Market Structure Citadel Letter at 17, Craig Louis Letter attached to Virtu Letter II at 32-33, and Virtu Letter II at 16. See supra section VII.C.1.b for a discussion of the Commission analysis referred to by commenters.

repeated here. When initially proposing and adopting Rule 612, the Commission acknowledged that lowering the tick size from fractions to $0.01 improved the trading environment.[1248] It also expressed concern, as stated by commenters, that further reducing the tick size for all stocks could harm market quality via pennying and reduced liquidity at the top of the book.[1249] When originally proposing Rule 612, the Commission also provided an analysis of sub-penny trading and quoting and stated that there was, at the time, no industry standard for trading and quoting increments.[1250] The Commission's sub-penny analysis suggested that, at the time, sub-penny trading was primarily used to facilitate pennying because sub-penny trades congregated at $0.001 and $0.009 rather than having a uniform distribution or clustering midpoint prices (i.e., in $0.005 increments), justifying the use of some minimum pricing increment.[1251]

When adopting Rule 612, the Commission did not empirically analyze whether a minimum pricing increment of $0.005 would have harmed or helped market quality for some stocks, and specifically did not opine on a tiered tick structure such as is being adopted. The analysis provided therein was in the context of a uniform tick size applicable to all stocks. Within this context, the Commission concluded that "the marginal benefits of a further reduction

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1248 See 2004 Regulation NMS Proposing Release, supra note 31, at 11170.

1249 Id.; see also Proposing Release, supra note 11, at 80280 ("Minimum pricing increments that are too small can also add to complexity in trading and increase the risk of stepping ahead"); see also supra note 994 for the definition and discussion of pennying.

1250 Id. at 11171. Although Nasdaq and the exchanges permitted quoting in single penny increments, these markets allowed trades to be printed in increments below a penny. Although certain online brokers only accepted orders priced in one-cent increments, ECNs and Nasdaq market makers accepted orders and executed trades in sub-penny increments. While market makers quoted through Nasdaq only in penny increments, they could display orders in ECNs in sub-pennies. Exchanges, where the majority of trading volume occurred, were bound by the Decimals Implementation Plan, which was ordered by the Commission, and which ultimately established $0.01 as the tick size for exchange quotes. Other market participants, however, were not so bound leading to non-standard quoting increments across various venues such as ECNs.

1251 Id. at 11169.

in the minimum pricing increment [below $0.01 for all stocks] are not likely to justify the costs to be incurred by such a move"[1252] The analysis provided in this release does not disagree with that assessment. Applying a tick size lower than $0.01 for all stocks could cause harm to stocks with wide quoted spreads due to pennying concerns and fragmenting liquidity.

Additionally, the need to address tick-constrained stocks has increased substantially in the subsequent nearly two decades as tick constraints have become more pervasive over time. Table 3 indicates that in 2023, about 74% of share volume was associated with securities trading with quoted spreads at or below $0.015; following the same methodology, in 2005 the figure was about 54%.[1253] This statistic understates the true increase in trading in tick-constrained securities because overall average daily trading volume has more than doubled over the same period of time.[1254] Thus, precisely because average quoted spreads have been coming down, the benefits of alleviating the tick constraint have increased substantially since 2005. Additionally, as discussed throughout this section, there has been considerable research since the implementation of Rule 612 in 2005 by the Commission, industry members, and academics surrounding tick sizes that did not exist when Rule 612 was adopted. This research supports the notion that a tick size below $0.01 will likely improve market quality for some stocks.

One commenter illustrated its disagreement with the Commission's use of the TSP analysis by presenting a hypothetical TSP in which the tick size is increased from $0.01 to

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1252 Id. at 11170.

1253 These patterns are not driven by a change in sub-dollar trading (which may benefit from a narrower tick size); the patterns are not materially changed when symbol-days with average prices below $2 or $5 are dropped from the sample.

1254 This statistic is computed by comparing the average daily share volume in all securities covered by WRDS Intra-day indicators in 2005 and 2023. Additionally, total trading volume has also more than doubled over that same time period. Thus, there is more trading volume and more of it is trading in a tick-constrained environment.

$0.15.[1255] The commenter stated that such a change "would have negatively impacted a greater range of stocks … and predictably liquidity conditions in those stocks would have meaningfully improved at the end of the pilot when the changes were reversed."[1256] The commenter proceeded to state that "this experiment would not suggest that regulators should always reduce the minimum quoting increment for tick-constrained symbols by a factor of *fifteen*."[1257] The commenter further stated that the TSP "merely reverted to the *status quo* after a failed experiment", and this "reversion provides no information on what would be expected to occur if minimum quoting increments were further reduced to levels that have never before been tested."[1258]

The Commission disagrees with this assessment in several respects and continues to believe that analysis of the TSP provides meaningful information for the effects of the amendments. The TSP enables analysis that empirically tests whether market quality depends on being tick-constrained. The TSP provides two events that can be used for this test: one at the start of the TSP when tick sizes were increased for certain stocks, and one at the end of the TSP where tick sizes for those same stocks were decreased. Academic research shows that the effects of both of these events are consistent with the theory that stocks with few ticks intra-spread have worse market quality.[1259] The Commission provided its own analysis of the end of the TSP; the end of the TSP involved a reduction in tick size, which directionally corresponds to what will happen under the adopted rule. This analysis found evidence to support the theory that stocks

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1255 See Citadel Letter I at 12.

1256 Id.

1257 Id. (emphasis in original).

1258 Id.

1259 See, e.g., Barardehi et al., supra note 231.

with too few ticks intra-spread have worse market quality. The Commission therefore disagrees that the TSP analysis "provides no information" as to the effects of the adopted rules.

The commenter states that "the end of the Tick Size Pilot provides no basis for suggesting that regulators should always reduce the minimum quoting increment for tick-constrained symbols by a factor of five." The Commission does not reach the conclusion that regulators should always reduce the minimum quoting increment by a factor of five, and indeed the Commission is not adopting such a rule. As discussed earlier in this section, TSP analysis indicates that for stocks with 1-2 ticks intra-spread, reducing the tick size improves market quality on average. While the Commission is reducing the tick size by a factor of two rather than five for some stocks, the direction is likely to be the same as what was observed in the TSP, though the magnitude may be different.[1260]

Furthermore, the commenter assumes in the hypothetical experiment of a bigger increase in the tick size, that this increase would have "negatively impacted" stocks. However, the fact that causing stocks to become tick-constrained worsens their market quality is an assumption made by the commenter. Absent evidence, such as the evidence provided by the TSP, it is unclear upon what the commenter bases this assumption. The ability to make this inference, that being tick-constrained worsens market quality, is precisely why analyzing the TSP is valuable because it provides the empirical result which permits one to employ with confidence the commenter's assumption in its hypothetical.[1261]

[1260] See supra note 1246 and surrounding text for additional discussion.

[1261] More specifically, the commenter's hypothetical assumes that the start of a large tick size increase would worsen liquidity, then concludes this means that evidence from the end of the TSP is uninformative because it simply reverses the effect. But, this conclusion is incorrect because the TSP results from both the imposition and conclusion of the TSP are what make the first assumption credible.

With regard to the commenter's statement that the TSP conclusion "provides no information on what would be expected to occur if minimum quoting increments were further reduced to levels that have never before been tested,"[1262] while it is true that the tick sizes in the adopted amendments are not among the tick sizes implemented in the TSP, this fact does not render the TSP analysis uninformative. The theory that stocks that are tick-constrained will trade better with more ticks intra-spread, successful as it was in predicting the market quality effects of the end of the TSP, can be reasonably relied upon to help determine the effects of the amendments. What matters is not the magnitude of the spread, or the size of the tick, but the number of ticks intra-spread.[1263]

One commenter stated that the analysis in the Proposing Release should have accounted for both fixed effects and volatility, as well as other variables.[1264] Barardehi et al. (2022) provide estimates that account for fixed effects and a number of control variables including volatility.[1265] This paper shows that the results shown in the Proposing Release and repeated below are robust to these effects.

Commission Empirical Analysis: The Proposing Release provided a review of the existing TSP empirical academic research.[1266] This research consistently found that stocks that became tick-constrained by the TSP, on average, traded better across many market quality dimensions when their tick size was reduced from $0.05 to $0.01. Some analysis also showed

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1262 See Citadel Letter I at 12.

1263 See infra section VII.F.1 for a discussion of reasonable alternative tick sizes.

1264 See Virtu Letter II at 15.

1265 See Barardehi et al., supra note 231. The authors control for market capitalization, dollar volume, average quoted spread, and return volatility, see analysis associated with their Table 11.

1266 See Proposing Release, supra note 11, section V.D.1.

that some stocks with wide spreads traded better with the $0.05 tick than with the $0.01 tick. The empirical analysis in the Proposing Release sought to identify the thresholds where the TSP tick size change transitioned from harmful, to benign, to beneficial. Specifically, Table 8 provides analysis that examines the impact of the end of the TSP on a wider range of quoted spread profiles than simply tick-constrained or not. This analysis focuses on the end of the TSP, when the tick size was reduced from $0.05 back to $0.01, because that event more closely matches the amendments, which reduce the tick size.

The analysis presented in Table 8 uses a difference-in-difference methodology to study the effect of lowering the tick size from $0.05 to $0.01 on TSP stocks at the end of the TSP.[1267] TSP treated and control stocks are assigned near the end of the TSP into one of four bins ranging from the most tick-constrained in the first bin to the least constrained in the fourth bin.[1268] Key variables such as quoted depth and spreads were measured before and after the tick size was lowered, and difference in difference estimation methods were used to examine how these

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1267 Difference-in-differences is a statistical technique in which the effect that a treatment has on some response variable is estimated by comparing the average change in the response over time in the treatment group to the average change in the control group.

1268 Bin assignments are calculated according to the stock's average quoted spreads for May and June of 2018, near the end of the TSP. Specifically, we use WRDS Intra-day indicators to collect the time-weighted quoted spread for all TSP and control stocks for each trading day in May and June 2018. Then for each stock we calculate the equally-weighted average quoted spread across all trading days. Based on this average, TSP and control stocks are sorted into one of four bins. The first bin is for stocks with quoted spreads ($0.00, $0.06). Empirically, for stocks in the TSP, this bin includes stocks that nearly always traded at the minimum quoting increment of $0.05 during the TSP. The second bin is for stocks with quoted spreads in the range ($0.06, $0.09). For stocks in the TSP, this bin is said to include those stocks with one to two ticks intra-spread during the TSP. The third bin is for stocks that had quoted spreads of ($0.09, $0.15) or approximately 2-3 ticks intra at a $0.05 tick increment. The fourth bin is for stocks with quoted spreads greater than $0.15. The TSP had three test groups: the first group applied the $0.05 tick only to quoting, the second group applied the $0.05 tick to quoting and trading (with exceptions for benchmark and midpoint trades and for certain retail price improvement trades), and the third group applied the $0.05 tick to trades and quotes the same as the second group but also had a trade at rule applied. Barardehi et al., supra note 231 provide similar analysis, and also expand the analysis in many dimensions. Their analysis finds evidence that all key results presented here are robust along many dimensions including the test group analyzed and to many other factors including fixed effects and volatility – factors that one commenter suggested that the Commission should consider in their TSP analysis, see Virtu Letter II at 17.

variables reacted to the tick size change. The analysis uses ordinary least squares[1269] and quantile (median) regressions[1270] to estimate the following regression model:[1271]

$$Y_{j,t} = \alpha_0 + \alpha_P Pilot_j + \alpha_E Event_t + \beta\left(Pilot_j \times Event_t\right) + u_{j,t}$$

where the quantile regression optimizes:[1272]

$$\beta \in \underset{\alpha_0,\alpha_P,\alpha_E,\beta}{\operatorname{argmin}} \sum_{j,t} \rho_{0.5}(u_{j,t})$$

Table 8: Effects of a Reduction in Tick Size on Quoting and Trading Outcomes[a]

	OLS				Quantile (median) regression			
	Quoted spread ($) May & June 2018				Quoted spread ($) May & June 2018			
Spread Bin #	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Depth (100 shares)	-22.5***	-5.30***	-1.55***	-0.51	-11.8***	-3.16***	-0.96***	-0.21***
	[-12.02]	[-7.09]	[-4.40]	[-1.30]	[-16.99]	[-23.52]	[-17.81]	[-4.30]
Depth ($1,000)	-16.7***	-8.41***	-4.67***	-2.06***	-11.2***	-7.27***	-3.96***	-1.48***
	[-14.58]	[-10.94]	[-7.82]	[-3.66]	[-22.04]	[-20.70]	[-12.58]	[-4.14]
Quoted Spread ($)	-0.033***	-0.027***	0.023***	0.12***	-0.034***	-0.031***	0.012**	0.12***
	[-18.71]	[-6.46]	[2.99]	[5.51]	[-35.41]	[-10.31]	[2.03]	[6.80]
	-0.0049***	-0.00097*	0.00034	0.0046***	-0.0041***	-0.0014***	0.00021	0.0034***

1269 Ordinary least squares (OLS) regression refers to a statistical technique for estimating the linear relationship between an independent variable and dependent variables by minimizing the sum of squared errors between the estimate and the observed independent variable. The use of OLS and quantile regressions is common in the literature on the TSP pilot.

1270 The primary advantage to quantile regressions is that they are less sensitive to outliers that can affect mean inference in OLS. Thus, median regressions provide additional robustness to the analysis and ensure that results are not driven by outliers.

1271 In this equation the variable *Y* denotes the response variable of interest such as quoted spread and depth. The subscripts *j* and *t* serve to index stocks and days respectively. α_0, α_p, α_e, and β are coefficients (to be estimated), and $u_{j,t}$ is the error term. $Pilot_j$ is an indicator variable that equals 1 if stock *j* was in the treatment group, or 0 if stock *j* was in the control group. $Event_t$ is an indicator variable which is equal to 1 if the day *t* was post the treatment event and equals 0 otherwise. Table 8 reports the difference-in-difference estimator of β for a different response variable *Y* across the different quoted spread bins. One commenter criticized this model for failing to include fixed effects and not controlling for other criteria such as volatility See Virtu Letter II at 15. A very similar analysis, which did consider fixed effects and a host of control variables including volatility, is included in Barardehi et al., supra note 231. Their analysis showed that all key results were economically unchanged when considering fixed effects and a host of control variables.

1272 In this equation $u_{j,t}$ is the error term from the previous regression specification equation, supra note 1271, and the loss function is defined as: $\rho_\tau(u) = \tau \max(u,0) + (1-\tau)\max(-u,0)$; where $0 < \tau < 1$.

Relative quoted Spread	[-9.59]	[-1.80]	[0.53]	[3.30]	[-8.54]	[-6.89]	[0.74]	[4.66]
Effective spread ($)	-0.027***	-0.026	0.029***	0.038**	-0.026***	-0.021***	-0.0018	0.051***
	[-4.97]	[-1.43]	[5.17]	[2.16]	[-58.10]	[-12.81]	[-0.63]	[4.81]
Relative eff. spread	-0.0039***	0.00043	0.0055	0.0028***	-0.0030***	-0.0010***	-0.00013	0.0016***
	[-3.12]	[0.17]	[1.36]	[4.42]	[-10.78]	[-9.58]	[-1.09]	[3.23]
Cancel-to-trade	5.10***	6.69***	7.56***	18.8***	4.56***	5.49***	6.87***	12.3***
	[5.99]	[6.38]	[6.79]	[8.44]	[7.75]	[7.79]	[10.44]	[10.61]
Odd-lot rate (%)	4.89***	5.61***	2.85***	1.49**	5.59***	6.39***	3.29***	1.85**
	[9.62]	[8.04]	[4.35]	[2.15]	[8.02]	[8.99]	[4.72]	[2.51]
Realized spread ($)	-0.014***	-.0099***	.00037	0.040***	-0.014***	-0.013***	-0.0068***	0.038***
	[-27.94]	[-7.43]	[0.12]	[4.45]	[-48.36]	[-17.96]	[-5.13]	[5.64]
Relative real. spread	-.0024***	-.00032	-.00039	.0014**	-.0014***	-.00054***	-.00013***	.0012***
	[-11.82]	[-1.36]	[-1.25]	[2.37]	[-14.08]	[-12.52]	[-2.77]	[3.65]
Volume (1,000 shares)	26.5	30.3**	12.5	-5.41	19.1	3.35	0.20	-3.25**
	[1.30]	[2.13]	[1.32]	[-1.07]	[1.42]	[0.40]	[0.04]	[-2.44]
Cum Depth 10c from mdpt	-0.17***	-0.26***	-0.27**	-0.34**	-0.49***	-0.54***	-0.45***	-0.63**
	[-3.93]	[-5.00]	[-2.59]	[-2.37]	[-5.51]	[-6.29]	[-4.91]	[-3.15]
Cum Depth -10c from mdpt	-0.22***	-0.19***	-0.37***	-0.45**	-0.49***	-0.42***	-0.50***	-0.79**
	[-5.28]	[-3.74]	[-3.44]	[-2.83]	[-6.33]	[-5.21]	[-5.68]	[-2.75]
CRT 10 round lots	-0.026***	-0.001	0.035***	0.14***	-0.037***	0.085***	0.035***	0.075**
	[-19.56]	[-0.19]	[3.99]	[1.03]	[-2.72]	[2.75]	[4.20]	[2.37]

[a] This table presents the effects of a reduction in minimum tick size from $0.05 to $0.01 cent on various quoting and trading outcome variables. The first bin is for stocks with quoted spreads ($0.00, $0.06). The second bin is for stocks with quoted spreads in the range ($0.06, $0.09). The third bin is for stocks that had quoted spreads of ($0.09, $0.15). The fourth bin is for stocks with quoted spreads greater than $0.15. A difference in difference regression with no control variables is estimated using data covering Control, Test Group 2, and Test Group 3 TSP stocks from 08/01/2018 – 11/30/2018. All observations are at the stock day level. For each outcome variable Y_{jt}, listed in the left-hand side column, the table presents only the difference in difference coefficient estimates that indicate the effect of the TSP on the dependent variable. Estimates are performed by past quoted spread subsamples that decompose the sample based on average quoted spreads during May -June of 2018. Among the outcomes' variables, the quoted spread refers to the distance between the NBBO midpoint and the NBBO quote. The effective spread is the distance between the NBBO midpoint and the realized trade price; the realized spread is the distance between a future NBBO midpoint (5-minutes ahead) and the trade price. Relative spread measures are calculated as the spread scaled by the NBBO midpoint. The cancel-to-trade ratio is the daily number of order cancellations divided by the number of trades, for displayed orders. The odd-lot rate is the percentage of trades in a day which executed against an odd-lot quote. CRT 10, or the cost of a round-trip trade of 10 round lots, measures the cumulative transaction costs from buying and then immediately selling 10 round lots. The CRT assumes that an order that is larger than the displayed depth at the best price will not execute in full at that price. Instead, the assumed unfilled portion will execute at worse prices until completely filled with displayed depth. All data are Winsorized at the 1% and 99% level. The numbers in the [] brackets reflect t-statistics that are based on two-way stock-and-date

clustered standard errors. Symbols *, **, and *** reflect statistical significance at 10%, 5%, and 1% type-1 error levels.

As discussed in the Proposing Release, this analysis provides evidence of a fundamental tradeoff between accurate pricing on one hand and incentives for liquidity provision on the other. Across all specifications, the end of the TSP was associated with a decrease in depth at the NBBO, when the tick size was reduced from $0.05 to $0.01, as signified by the negative and, in most cases, statistically significant coefficients reported. The reduction in shares available at the NBBO was the greatest for stocks with tighter quoted spreads and smaller for stocks with wider quoted spreads. The finding that tighter quoted spread stocks experience the greatest decline in depth at the NBBO is consistent with the idea that, for these stocks, the $0.05 tick was the most constraining, and so liquidity that would have naturally spread out within the quoted spread given a smaller tick, bunched at the wider tick increments, and that once the tick-constraint was relaxed this liquidity naturally spread out over the additional price levels. For less tick-constrained stocks, the bunching was less severe since liquidity already had some room to spread out.

One commenter stated that the Commission did not provide any analysis of the effect of the proposal on displayed liquidity and liquidity deeper in the book, including with respect to less liquid securities and during times of market stress.[1273] The Proposing Release did examine the effect of a tick reduction on displayed liquidity and cited academic literature for further analysis.[1274] The same commenter stated that reducing the tick as presented in the proposal

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[1273] See Citadel Letter I at 9.

[1274] See Proposing Release, supra note 11, section V.D.1.

would reduce depth at the NBBO by more than 82%.[1275] The Commission acknowledges that, given the magnitude of the reduction in the proposal, it is conceivable that such a reduction could have occurred for some stocks. Barardehi et al. (2022) document that depth at the NBBO was 50% lower with the $0.01 tick compared to the $0.05 tick. However, this was only true for tick-constrained TSP stocks. For stocks with wide quoted spreads, depth was only about 16% lower with the smaller tick size. The TSP was associated with a 1:5 tick size split, and the proposal that the commenter was commenting on would have created a 1:10 split for some stocks relative to the baseline. In contrast, the adopted amendments create a smaller split than either a 1:5 or a 1:10 split. The Commission does expect depth at the NBBO to decrease for stocks receiving the smaller tick size with the TSP analysis providing a likely higher end estimate of the magnitude of the decrease since the TSP was a bigger change to the baseline than the adopted amendments.

For stocks in the first or second bins, Table 8 demonstrates that lowering the tick to $0.01 leads to significantly lower quoted spreads. These stocks went from having approximately 1-2 ticks inside the quoted spread, with a $0.05 tick, to having 1-10 ticks inside the quoted spread, with a $0.01 tick. This finding is consistent with the idea that for stocks that are tick-constrained the effect of decreasing the tick size will narrow quoted spreads by improving competition. For the stocks in the third and fourth bins, the story is different, as the reduction in the tick size leads to wider quoted spreads. These stocks went from having more than two or more ticks within the quoted spread, with a $0.05 tick, to having more than 10 ticks within the quoted spread, with a $0.01 tick. This result is consistent with the idea that for wider quoted spread stocks, the prevailing effect of reducing the tick size was to increase transaction costs and widen spreads by

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[1275] See Citadel Letter I at 5.

fragmenting liquidity and increasing the risk of pennying which made trading more costly leading to wider quoted spreads. This pattern of results – namely narrower spreads for the first and second bins and wider spreads for the fourth -- holds regardless of whether dollar spreads, relative spreads, OLS, or quantile regressions are used, suggesting this is a robust outcome of the end of the TSP.

The pattern for effective spreads is similar to that observed for quoted spreads. Effective spreads measure the average realized transaction cost for trades as it measures the absolute distance between the realized trade price and the NBBO midpoint at the time of the trade. Effective spreads do not always equal quoted spreads because trades can execute inside the NBBO for numerous reasons, such as odd-lot trades, midpoint trades, and hidden orders. For stocks in bin one – i.e., stocks for which the $0.05 tick was the most restrictive – all specifications suggest that reducing the tick size was associated with a decrease in realized transaction costs as measured by effective spreads. For stocks in bin four, those with the widest quoted spreads prior to the tick size reduction, all specifications suggest that the reduction in the tick size leads to an increase in transaction costs, measured by effective spreads. For stocks in between these extremes in bins two and three, the results are not as uniform. For stocks in bin two, the sign of the coefficients for all estimates (dollar effective spreads, relative effective spreads, OLS, and quartile regressions) suggests lowering the tick size decreased effective spreads, although not all specifications agree as to statistical significance. The OLS regressions suggest that the effect was statistically insignificant, while the quantile regressions found a statistically significant effect and suggest that effective spreads decreased. For stocks in the third bin, the analysis did not find a consistent, statistically significant change in effective spreads, or

in other words, moving from roughly two to three ticks within the spread to ten to fifteen ticks did not appear to reliably help or harm transaction costs as measured by effective spreads.

These results, like the results for quoted spread, suggest that for stocks for which the narrowing of the tick size meant that the stock went from having less than 2 ticks within the quoted spread to 1-10 ticks within the quoted spread, the effect of reducing the tick was beneficial in terms of reducing transaction costs. For stocks with very wide quoted spreads, reducing the tick size appeared to harm liquidity, which is consistent with fragmentation and pennying being the prevailing effect.

The theoretical discussion above suggests that executing a larger order may become more complex with a smaller tick size – meaning it may take visiting more venues as well as executing across more price levels to execute an order with a smaller tick size. This potential outcome is explored using the "cancel-to-trade" ratio. A higher ratio indicates more frequent canceling of orders per the amount of trading volume, and it is an indication that market participants are more active in managing their quotes and their order strategies. In this analysis, both the OLS and the quantile regressions confirm that a smaller tick resulted in a statistically significant increase in the cancel-to-trade ratio, suggesting more complexity. Additionally, the magnitude of the effect is increasing in the quoted spread, with wider quoted spreads having larger coefficients, suggesting a larger effect in the cancel-to-trade ratio for stocks with wider spreads. This pattern is consistent with pennying and increased complexity having a greater impact on stocks with wider quoted spreads. These stocks are unlikely to receive the smaller tick size under the adopted amendments.

The analysis also looks at the effect of lowering the tick size at the end of the TSP on the usage of odd-lot orders. Across all quoted spread bins, the usage of odd-lot orders increases

when the tick size decreases. This finding is consistent with the notion that liquidity will be spread out over more levels leading to an increased use of odd-lot orders to allow liquidity providers to offer smaller levels of liquidity at finer price increments.[1276] This result also suggests that a lower tick size increases the need for market participants to have ready access to odd-lot information given that the lower tick size can be expected to increase the usage of odd-lot quotes.

Effective spreads provide a measure of liquidity providers' revenue for the immediate execution of an incoming order and the contrasting economic effects also have implications for how liquidity providers' revenue will be affected by a lower tick. The effective spread captures the liquidity premium, paid by those submitting orders for immediate execution, and can theoretically be decomposed into two components: *Effective Spread = Realized Spread + Price Impact.*[1277] One component of the effective spread is the price impact or adverse selection component. It is the change in the NBBO midpoint at the time of trade to some point in the future. This component of the effective spread captures the portion of the effective spread liquidity providers lose from trading with investors who are more informed than they are and is also referred to as the adverse selection component of the bid-ask spread. The remainder of the effective spread, after removing the adverse selection component, is the realized spread. This

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1276 See also Virtu Letter II at 6.

1277 Effective spreads can be interpreted as what liquidity providers expect to earn from providing liquidity, assuming that prices do not change before the liquidity provider is able to unwind its position and realize its profit. Under this interpretation, realized spreads would proxy for what liquidity providers actually earn, taking into account that the market price may have moved against the liquidity provider before it could unwind its position. *Effective Spread = Realized Spread + Price Impact.* For a full mathematical decomposition of effective spreads into realized spread and price impact components see Peter N. Dixon, Why Do Short Selling Bans Increase Adverse Selection and Decrease Price Efficiency, 11 REV. ASSET PRICING STUD. 122 (2021) app. at 165.

portion of the effective spread acts as a proxy[1278] for the compensation to the liquidity provider for its non-adverse selection costs. If a smaller tick decreases revenue for liquidity providers, by allowing bid and ask prices to more accurately reflect supply and demand, then this effect should manifest as a decrease in realized spreads for liquidity providers. However, if increased order book fragmentation and pennying risk increase the cost of providing liquidity, then liquidity providers will need to be compensated for these costs in order to provide liquidity and, thus, realized spreads will increase. To the extent that the two effects offset one another, realized spreads might not change.

For tick-constrained stocks in bin one, the analysis indicates a decrease in realized spreads across all specifications, and when using dollar or relative realized spreads when the tick size was reduced from $0.05 to $0.01. This result is consistent with the notion that liquidity providers' non-adverse selection revenues will decrease due to bid and ask prices being more reflective of supply and demand with a smaller tick. The opposite occurs for stocks with wide quoted spreads in bin four, where realized spreads increase significantly – consistent with liquidity providers needing to be compensated for the increased cost and complexity associated with trading a wide quoted spread stock in a small tick environment. For stocks in the middle two bins, the effect of lowering the tick size on realized spreads is unclear, as about half of the

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[1278] Realized spreads do not measure the actual trading profits that market makers earn from supplying liquidity. In order to estimate the trading profits that market makers earn, we would need to know at what times and prices the market maker executed the off-setting position for a trade in which it supplied liquidity (e.g., the price at which the market maker later sold shares that it bought when it was supplying liquidity). If market makers offset their positions at a price and time that is different from the NBBO midpoint at the time lag used to compute the realized spread measure (Rule 605 realized spread statistics are measured against the NBBO midpoint 5 minutes after the execution takes place), then the realized spread measure is an imprecise proxy for the profits market makers earn supplying liquidity.

specifications indicate no change in realized spreads while the other half indicate lower effective spreads.

One commenter states that the Proposing Release did not address how the rule would affect institutional transaction costs, given that institutional traders frequently trade, and are concerned with sourcing larger quantities.[1279] However, as considered here, and in the Proposing Release, the Commission considered multiple measures of depth beyond the NBBO, and Barardehi et al. (2022) also considers more. This depth beyond the top of the book analysis uses MIDAS data to study how the tick size change affected liquidity deeper in the book. Analyzing liquidity deeper in the book is valuable because it gives an indication of how trading larger orders, which must go deeper in the book to be fulfilled may be affected by a change in the tick size. Specifically this analysis calculates the daily average cumulative shares available at $0.10 above and below the midpoint for control and treated stocks, and uses the same difference-in-difference analysis to examine the effect of reducing the tick size on cumulative depth.[1280] Our analysis suggests that reducing the tick size also reduced the total depth available deeper in the book with the coefficient for bin 4 – i.e., those with the widest quoted spreads – being the largest in magnitude. This finding is consistent with a smaller tick discouraging the posting of displayed liquidity due to pennying concerns for stocks with wide quoted spreads.

These depth of book findings do not directly imply that trading deeper in the book became more expensive for two reasons. First, research suggests the use of non-displayed

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1279 See MEMX Letter at 10.

1280 In the regressions we take the natural log of shares available. This conversion helps standardize shares available for stocks with different prices by making the interpretation in terms of percentage changes. See also e.g., STA Letter at 6 and CCMR Letter at 24 suggesting that a smaller tick size could affect depth deeper in the book.

quotations increases significantly when the tick size is reduced.[1281] Thus the decline in liquidity that we document is only a decline in displayed liquidity. Second, quotes tend to congregate at the price just worse than the quoter's desired price so that the quoter does not lose money on a transaction. When a wider tick is tightened, quotes that were previously congregated at the wide tick will spread out at prices better than the previous tick allowed. Thus, a market participant taking liquidity from multiple price layers in the order book to fulfill an order will have some shares that transact at superior prices than it would have with the wider tick.[1282]

Table 8 also presents the effect of the TSP conclusion on the round-trip cost to transact a trade for 10 round lots (1,000 shares).[1283] This analysis suggests mixed results for the effect of the tick size reduction on the cost of executing a 10-round lot trade. For bin 1 stocks, the total round-trip cost of a 10-round lot trade decreased when the tick size was lowered – suggesting an improvement in liquidity deeper in the book. For stocks in bin 2 (i.e., less tick-constrained stocks), the effect was not clear. The OLS regressions suggested no effect, while the quantile

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1281 See analysis presented in Nasdaq Intelligent Tick Proposal, supra note 150; see also Justin Cox, et al., Increasing the Tick: Examining the Impact of the Tick Size Change on Maker-Taker and Taker-Maker Market Models, 54 FIN. REV. 417 (2019); Amy K. Edwards, et al., The Effect of Hidden Liquidity: Evidence from an Exogenous Shock (working paper Mar. 1, 2021), available at https://ssrn.com/abstract=3766512 (2021) (retrieved from SSRN Elsevier database).

1282 Consider a numeric example. A market with a $0.05 tick is quoting asks of 500 shares at $10.05 and 500 shares at $10.10. An investor wishing to purchase 700 shares would purchase 500 at $10.05 and 200 at $10.10 for a total price of $7,045. If the tick shrinks to $0.01 and cumulative shares posted decline by 20% - for example – but those shares are spread evenly over the finer grid then there would be 80 shares at each price level from $10.01 to $10.10. An investor wishing to buy 700 shares would need to purchase 80 shares at each price level from $10.01 to $10.08 and 60 shares at $10.09 for a total purchase price of $7,034. So even though total depth declined, the cost to execute a 500-share trade would decrease due to more efficiently spreading liquidity across more price levels.

1283 A round-trip trade refers to executing an order to buy or sell the stock and immediately reversing the position with an equal countervailing order. We compute the cost of a roundtrip trade following the methodology laid out in Griffith and Roseman (2019), supra note 1002 and Chung, et al., supra note 1209. The methodology uses MIDAS data to take snapshots of the order book at 15-minute increments throughout the trading day and calculates the transaction costs associated with walking the book up 5 or 25 round lots to execute a large trade.

regressions suggested an increase in trading cost. For stocks in bins 3 and 4 (i.e., those that were not tick-constrained by the $0.05 tick), the effect of lowering the tick size was to increase transaction costs for larger trades. These results cohere with the idea that when stocks are tick-constrained the pricing efficiency made possible by a smaller tick improves liquidity, and for stocks with wider quoted spreads a smaller tick harms liquidity by making individuals less willing to post displayed liquidity due to complexity and the risk of pennying.

In conclusion, the analysis provided here suggests that, for stocks that were limited to just 1-2 ticks intra-spread by the $0.05 tick, the reduction to a $0.01 tick provided an improved trading environment. Thus, trading in an approximate 1-10 tick range intra-spread provided a superior environment to trading in a 1-2 ticks intra-spread range. One caveat here is that the analysis highlights a key tradeoff with a smaller tick for stocks with narrow quoted spreads. They tend to have less depth at the NBBO, but narrower quoted spreads. Thus, the total effect of this tradeoff on execution costs is largely a function of the size of the trade being implemented with smaller trades receiving improved terms while sufficiently large trades get worse terms with a narrower quoted spread. However, as discussed in greater detail in Barardehi et al. (2022), for tick-constrained stocks the point in terms of trade size at which a tick size reduction harms execution quality is quite large, around 50 round lots.[1284] Additionally, for stocks with quoted spreads greater than $0.15, where a $0.01 tick implied more than 15 ticks intra-spread, a $0.05 tick where there were only 3 ticks intra-spread, appeared to provide a superior trading environment. For stocks with quoted spread between $0.10 and $0.15, it is not clear which tick size provided a superior trading environment.

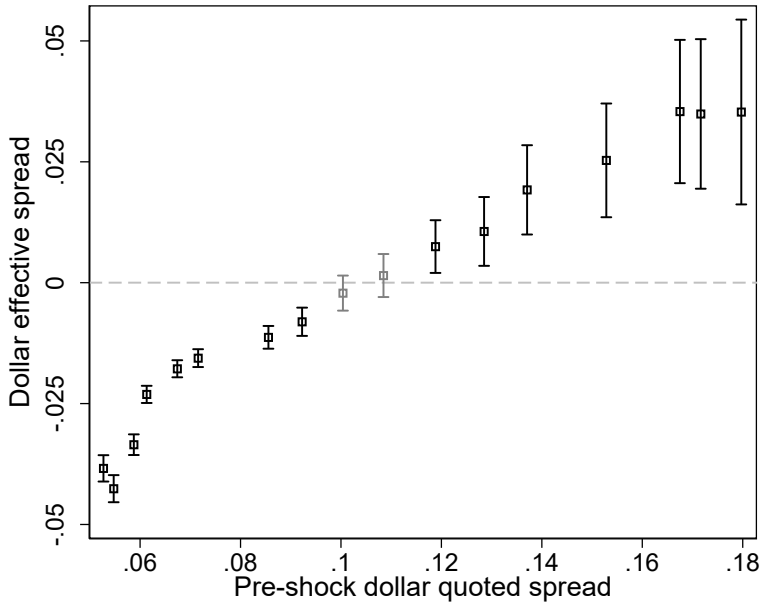
[1284] See Barardehi et al. (2022) Table 4. See also Citadel Letter I at 11 requesting an analysis of the joint impact on depth and quoted spread. See also Virtu Letter II at 18 stating that lower quoted spreads would harm markets by reducing the incentive to post liquidity.

In Figure 2, data analysis shows how the quoted spread of a stock during the TSP ("pre-shock dollar quoted spread") correlates with how investor transaction costs, as captured by effective spreads, changed when the TSP ended. For stocks with an average of fewer than two ticks intra-spread (i.e., those with pre-shock quoted spreads of $0.10 or less), a reduction in tick size from 5 cents to 1 cent significantly reduces effective spreads.[1285] For stocks with an average of more than three ticks intra-spread (i.e., those stocks with pre-shock quoted spreads greater

[1285] See Proposing Release, supra note 11, at 80322-80323, including Figure 2, which is also in Barardehi et al., supra note 231.

than $0.15), a narrower tick size increases effective spreads. These results are broadly consistent with the findings reported in Table 8.

Figure 2: Difference-in-Difference Effect of the end of the TSP on Dollar Effective Spreads



Source: Stocks in the TSP imposition period 08/12/2016-12/14/2016, where tick size increased from 1¢ to 5¢ for pilot stocks, are grouped into overlapping 6¢ intervals of average May and June 2016, i.e., pre-shock, quoted spreads: {(0,6¢),(1¢, 7¢), . . . ,(15¢, 21¢),(16¢, 22¢). Stocks in the TSP conclusion period 08/08/2018-11/20/2018, where tick size decreased from 5¢ to 1¢ for pilot stocks, are grouped into overlapping 6¢ intervals of average May and June 2018, i.e., pre-shock, quoted spreads. For each intervals, the effect of a tick size change on dollar effective spreads is estimated via difference-in-difference quantile (median) regressions that control for date fixed effects and double-cluster standard errors by stock and date. Point estimates of the treatment effects along with the corresponding 95% confidence intervals are plotted against the median pre-shock quoted spread in the respective interval. See Proposing Release, supra note 11, at 80322-80323, Figure 1. See also Barardehi et al., supra note 221.

The Commission's results in Table 8 provide useful information for predicting how the tick size reduction associated with the amendments may affect market quality for stocks priced at, or greater than, $1.00 per share and that receive the $0.005 tick size compared to the current baseline. For stocks with prevailing quoted spreads less than $0.015 there would generally be at most 1.5 ticks intra-spread with a $0.01 tick, or 3 ticks intra-spread with a $0.005 tick. The

analysis in Table 8 for bin one stocks suggests that 1-5 ticks intra-spread provides a better trading environment than does just one tick intra-spread.[1286] Additionally, the results for bin 2 stocks suggest that moving from 1-2 ticks intra-spread to 5-10 ticks also generally improves market quality across most measures. In short, the TSP analysis suggests that stocks with fewer than 2 ticks intra-spread on average benefited from a tick size reduction. Consequently, this analysis provides support for the belief that reducing the tick size for stocks that generally have at most 1.5 ticks intra-spread is likely to improve market quality for these stocks. One concern discussed earlier in this section is that a reduction that is too aggressive could harm market quality by providing too many ticks intra-spread. However, the analysis provided in Table 8 does not support this outcome since the Tick Size Pilot stocks in bin 1 and bin 2 still saw market quality improvements, implying that narrow tick concerns didn't yet dominate the effect on these stocks, it is unlikely that the smaller tick size reduction associated with this Rule would lead to small tick problems diminishing market quality.

Additional Sources of Information: Commenters also suggested additional settings to identify when stocks are trading with the optimal number of ticks intra-spread. One commenter suggested that the Commission should have considered the European Union's tick size approach,

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1286 One academic theoretical paper suggests that having a two-tick quoted spread is optimal. See Sida Li & Mao Ye, Discrete Prices, Discrete Quantities, and the Optimal Price of a Stock (working paper Mar. 8, 2021, revised Jul. 7, 2023), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3763516 (retrieved from SSRN Elsevier database). The paper suggests that stocks reach their optimal price whenever the quoted spread is two ticks wide. While the paper advocates for a lower tick size, particularly for tick-constrained stocks, the two-tick quoted spread conclusion is the result of a highly stylized trading model which does not take into account pertinent factors from outside the model which likely affect quoted spreads such as considerations of time priority and pennying concerns. Conditional on there being non-infinitesimal tick and round-lot sizes, their model suggests that a two-tick wide quoted spread is optimal. Otherwise, their model suggests an optimal policy choice of infinitesimal tick and round-lot sizes.

associated with MiFID II, which assigns one of over 20 variable tick sizes based on trading price and number of transactions per day, and Japan's tick size approach.[1287]

One paper on the European experience cited by commenters studied the effects of a new tick regime introduced by MiFID II on 511 stocks listed on Euronext Paris and found results similar to the TSP analysis in Table 8.[1288] In this study the authors point out that MiFID II led to tick size increases for 339 stocks and decreases for 82 stocks. Tick increases were followed by a widening of the quoted spread, an increase in depth near the top of the book, and a reduction in message traffic. Like the TSP analysis in Table 8, tick decreases were followed by a narrowing of quoted spreads, reductions in depth at the top of the book, and an increase in message traffic; for a relatively wide price interval, depths remained unchanged. Table 8 finds a reduction in the cost of a round lot trade when low quoted spread securities experience a reduction in the tick; similarly, the analysis of MiFID II documents a reduction in transaction costs when the tick is reduced and the size of the trade is held constant. In sum, the effects of a change in tick size on Euronext Paris largely mirror the effects documented with the TSP in Table 8, indicating that the Commission's analysis is documenting a generalizable phenomenon.

However, there are several limitations to using studies of Europe's tick size regime. Research based on experience with the E.U. regime is difficult to apply to this Rule because the criteria in this Rule for determining the tick size is the TWAQS, which is not a factor in the European setting. When tick sizes change in Europe, it is due to changes in price or trading

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1287 See CCMR Letter at 27.

1288 Autoritè Des Marchès Financiers (AMF), MiFID II: Impact of the New Tick Size Regime (March 2018), available at https://www.amf-france.org/sites/institutionnel/files/contenu_simple/lettre_ou_cahier/risques_tendances/MiFID%20II%20Impact%20of%20the%20New%20Tick%20Size%20Regime.pdf. This paper was cited in Nasdaq Letter I at 10; Tradeweb Markets Letter at 4; Robinhood Letter at 50-51; and IEX Letter I at 13.

volume which can simultaneously affect quoted spreads. The Commission is unaware of research using the tick sizes associated with MiFID II to identify the thresholds, in terms of quoted spread, where a stock likely benefits or is harmed by a modification of the tick size, and the commenter did not provide such research.

In addition, it could be difficult to apply such analysis to the U.S. setting due to a number of structural differences between the European market and the U.S. markets. Key among these is that European financial markets are not as integrated as the U.S. national market system. For example, there is currently no consolidated tape or requirement to route orders to the exchanges with the best prices in the E.U.[1289] This fact can affect inference in the context of analyzing this Rule because it means that existing studies of the effect of the European tick size regime are generally limited to one exchange (e.g., the London Stock Exchange).[1290] This can be a significant limitation when trying to apply insights from European studies to U.S. markets because, as has been found in existing research, using data from one exchange as compared to across all exchanges can lead to opposite market quality effects being documented.[1291]

As discussed above, a commenter also suggested that the Commission should have considered the effects of tick size modifications in Japan to inform the appropriate thresholds for the tick size change considered in this Rule.[1292] The Tokyo Stock Exchange (TSE) assigns tick

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1289 See Rule 611 and supra note 226.

1290 See, e.g., Eros Favaretto et al., Impact of MiFID II Tick-Size Regime on Equity Markets—Evidence From the LSE, 29 EUR. FIN. MGMT. 109, 109-149 (2023).

1291 For example, Chung, et al., supra note 1209, which uses data from all US exchanges, and Griffith and Roseman (2019), supra note 1002, who use data from just Nasdaq produce opposite findings in some areas concerning the effect of the TSP on various dimensions of market quality – i.e., the effect of the TSP on the cost to trade very large orders.

sizes ranging from 0.1 (JPY) to 100,000 (JPY) depending on the price of the security in question. Stocks in the TOPIX 100 index have a different tick size schedule than do other securities. Again, making inferences from the TSE to this Rule is difficult due to the structural differences between the way that the tick sizes operate. On the TSE, tick sizes are price determined, under this Rule, tick sizes depend on the prevailing quoted spread.[1293] Additionally, trading in Japan is largely consolidated on the TSE, whereas in the United States it is considerably more fragmented suggesting the same issue relating to inference as can occur with the European studies.

In considering the experience in the Japan markets, one study used the median quoted spread to divide stocks on the TSE and examines market quality.[1294] These researchers find that a tick size reduction reduces quoted spreads for both the narrower and wider quoted spread stocks – although the effects are considerably larger for narrower quoted spread stocks. The results of this study are consistent with those in this release as it documents that for some stocks, particularly those with narrower quoted spreads, reducing the tick size can reduce quoted spreads. This study also documents that depth at the best prices also tends to decrease with a smaller tick. However, this study has limitations in the context of using it to determine the optimal tick to quote size ratio because the authors do not separate stocks using a nominal quoted spread threshold which would allow inference about how stocks with quoted spreads above or below a certain threshold were affected by the tick size. Rather, they simply bifurcate the sample in half which doesn't apply a specific quoted spread threshold and so it is difficult to discern from their study what the optimal tick to quoted spread threshold will be.

[1293] See infra section VII.D.1.b.iii for additional discussion of price as a determinate of tick-constrained securities and thus of the tick size.

[1294] See Ingrid M. Werner et al., Tick Size, Trading Strategies and Market Quality, 69 MGMT. SCI. 3818 (2023).

One commenter presented two industry studies based on reverse stock splits showing large reductions in percentage spreads and hence trading costs following reverse splits.[1295] When a stock undergoes a reverse split, its share price rises. All else equal, one would expect quoted spreads to widen in proportion so that the trading cost remains constant as a percentage of price. If the stock is tick-constrained, however, a reverse split causes the current penny tick to become lower relative to the (higher) post-split price, relieving the tick constraint and reducing trading costs as a percentage of the trade amount.[1296] One study presented evidence from GE's eight-for-one reverse split, and showed that trading costs—as measured by the quoted spread as a fraction of the stock price—fell 75%.[1297] Another study presented evidence from five tick-constrained ETPs that underwent a five-for-one reverse split; the study found that trading costs for these ETPs declined substantially.[1298] These studies are consistent with results in Table 8 above—when the tick constraint is relaxed, the quoted spread becomes smaller relative to the share price, thereby reducing transaction costs.

Some commenters provided explicit specifications of what they stated is the optimal tick to quoted spread range.[1299] These commenters presented evidence and views typically suggesting

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1295 See Why GE's basis point spread was four times higher before its reverse split attached to MEMX Letter at 43-63; see also The Tick Size Debate Revisited attached to MEMX Letter at 64-70.

1296 See supra note 1064 for a numerical example showing the effect that a reverse split has on transaction costs for a tick-constrained stock.

1297 See Why GE's basis point spread was four times higher before its reverse split attached to MEMX Letter at 43-63. Chart A of the study indicates that the reverse split caused the average quoted spread as a fraction of the share price to decline from approximately 8 basis points to 2 basis points.

1298 See The Tick Size Debate Revisited attached to MEMX Letter at 64-70. The appendix of the study indicates that the reverse split caused transaction costs to fall by more than 40% for tick-constrained ETPs, with some ETPs experiencing cost reductions of 80%. The study further indicates at 66 that similar results, "can be achieved by amending the tick regime to simply allow more granular prices, without the need to change the price of the security in question."

1299 Nasdaq Letter I at 8 provides some empirical analysis suggesting that 2 to 3 or maybe 2 to 4 ticks intra-spread is optimal. Pragma Letter at 1 uses data from stock splits to suggest that 1.5 to 4 ticks is optimal and

that 2 to 4 ticks intra-spread may be the optimal range. Given the analysis of these commenters, analysis presented here, and additional research,[1300] the Commission believes that the amendments, which only reduce the tick size when prevailing quoted spreads fall below $0.015, are likely to improve market quality for these stocks on average and are unlikely to lead to detrimental pennying or complexity concerns. Specifically, while there will likely be less depth at the NBBO and at each price level, quoted and effective spreads are likely to decline such that the cost of executing small and medium size trades will likely decline. Pennying is unlikely to predominate. This is because, at most, the smaller tick size will result in 3 ticks intra-spread. The analysis contained in this release, additional research,[1301] and commenters tend to agree that pennying is unlikely to be a dominant effect at 3 ticks intra-spread.[1302] In fact, 3-ticks intra-spread falls in the middle of the 2 to 4 ticks intra-spread suggested as potentially optimal by many commenters.[1303]

The narrower quoted spreads from a smaller tick size may result in fewer opportunities for price improvement by retail wholesalers, which may cause execution quality for wholesalers as measured by price improvement statistics to appear worse. However, the prices that retail

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that more than 4 is too many. RBC Letter at 3 cites research that 2 ticks intra-spread is optimal. CCMR Letter at 23 cites academic research suggesting 2 ticks intra-spread may be optimal. XTX Markets Letter at 4 suggests 2 to 4 ticks intra-spread as optimal. MMI Letter at 5 suggests 3-9 as optimal. IEX Letter I at 14 states for 2 to 4 ticks intra-spread. Budish Letter at 5 indicating that two or fewer is too few and suggesting that 2 to 4 may be reasonable. Harris Letter at 7 suggesting 2 ticks intra-spread.

1300 See Barardehi et al., supra note 231.

1301 Id.

1302 One commenter stated that at 4 or more ticks intra-spread hidden orders become more prevalent which can harm market quality. See IEX Letter I at 12. However, the smaller tick size implemented by the Rule will not result in 4 or more ticks for the associated stocks and so, even if true, the effect suggested by the commenter is unlikely to play a large role in market quality because the rule will not result in 4 or more ticks intra-spread for stocks receiving the $0.005 tick size.

1303 Other commenters expressing support for a $0.005 tick for stocks with narrow quoted spreads include Schwab Letter II at 6, STA Letter at 7, XTX Letter at 4.

investors receive for trades in stocks receiving the lower tick size is likely to improve overall relative to the baseline due to a narrower quoted spread, even though the portion of their price labeled price improvement may decline.

One commenter suggested generally that the Commission use simulations to determine the optimal tick size without providing details about how such a simulation could be structured.[1304] However, it is unclear how such simulations would be structured, and the Commission is unaware of existing simulations or of existing frameworks for simulations studying the effect of tick sizes on market quality. Challenges associated with simulations include model accuracy and complexity, data quality, computational limitations, uncertainty and sensitivity, validation and verification, scalability, and the challenges associated with applying simulations to human behavior which is inherently unpredictable, and the challenges associated with modeling dynamic and evolving systems like financial markets.

One commenter, while not opposing a half-cent tick for some stocks, stated that volume on inverted exchanges implied that there may not be a demand to trade with significantly narrower tick sizes.[1305] Inverted venues, which as discussed in section VII.C.2.b, offer a rebate to liquidity demanders and charge a fee to liquidity providers effectively allow market participants to price orders within the tick by the amount of the rebate to liquidity demanders. The commenter states that if there were significant demand to trade within the tick size, then we would expect to see inverted exchanges capture significant market share among truly tick-constrained stocks.[1306]

1304 See Mitre Corp. Letter at 5.

1305 See IEX Letter I at 14.

1306 Id.

This argument, however, does not take into account the fact that inverted exchanges are less likely to be at the NBBO than maker-taker exchanges and thus the risk of an order not being able to be fulfilled on an inverted exchange is higher.[1307] If the inverted exchange cannot fill an order it would generally re-route it or cancel it, depending on the terms of the order. Both options are costly as re-routing orders usually involves a re-routing fee charged by the routing exchange and an access fee charged by the receiving exchange, which would make the trade more expensive to transact relative to just sending it first to a high volume maker-taker exchange. The transfer would also take a small amount of time which could increase adverse selection risk for the re-routed order. Failing to execute the order is also costly as it could expose the trader to increased costs if the market moves against the trader in the time it takes to submit a new order. Consequently, market share on inverted exchanges may be low for reasons other than the stock being tick-constrained. For these reasons, low volume on inverted exchanges is not sufficient to identify demand to trade within the quoted spread.

iii. Alternative definitions of tick-constrained

Some commenters supported using TWAQS to determine which stocks are tick-constrained.[1308] Other commenters stated that other criteria, in addition to or in place of the quoted spread was needed to identify truly tick-constrained securities.[1309] One commenter stated that adding additional criteria would decrease complexity as it would limit the number of stocks receiving a smaller tick size, and would prevent stocks from bouncing back and forth between

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1307 Id.

1308 See, e.g., Budish Letter at 4 and Harris Letter at 7.

1309 See, e.g., T. Rowe Price Letter at 4, NYSE Letter I at 3, BlackRock Letter at 5, Citadel Letter I at 30. Optiver Letter at 1, 2. See also infra section VII.F.1.a for additional analysis of these alternatives.

tick regimes.[1310] The Commission agrees with commenters that the quoted spread is sufficient to determine whether a stock is tick-constrained as a matter of principle but acknowledges that not all stocks receiving the lower tick size will react in the same manner to the tick size. The Commission has considered commenters' views regarding variables other than quoted spread, and has conducted additional, supplemental analysis, presented in this section.

Commenters' suggestions for additional variables fell into three broad categories. The most common type of suggestion involved a depth measure, with commenters questioning whether a stock with a narrow-quoted spread was actually tick-constrained if the sizes of the quotes were small.[1311] Others suggested metrics based on trading volume.[1312] Another commenter suggested price as a measure of tick constraint.[1313]

Some commenters stated that even stocks with the narrow quoted spread may not benefit from a smaller tick unless other criteria were met.[1314] For example, commenters stated that reducing the tick size for stocks that have narrow quoted spreads, but low depth, could lead to pennying which could harm market quality.[1315] Another commenter stated that if there is insufficient depth, a narrower tick size could harm market quality by fragmenting liquidity over

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1310 See Citadel Letter II at 4. The Commission considers the effect of stocks moving between tick size regimes in section VII.D.1.d, infra.

1311 See, e.g., Invesco Letter at 3 suggesting that we consider whether a stock had multiple bids and offers at the NBBO. BlackRock Letter at 5 suggesting we consider Average Quoted Size. Citadel Letter I at 30 suggesting we consider average size at the NBBO/Daily volume. Cboe, State Street, et al. Letter at 2 and BlackRock Letter at 5 suggesting we consider quote size at the NBBO to average trade size, NYSE Letter I at 3 suggesting a quote stability measure of how long it takes the NBBO to return to pre-trade levels after a trade takes liquidity at the NBBO. T. Rowe Price Letter at 4 suggesting that depth could be measured by how many exchanges are currently quoting the NBBO.

1312 See, e.g., BlackRock Letter at 5, Citadel Letter I at 30 (both suggesting trading volume as a measure of tick-constrained) and T. Rowe Price Letter at 4 (suggesting a turnover based measure of tick-constrained).

1313 See BlackRock Letter at 5.

1314 See, e.g., Citadel Letter I at 5-6 and BlackRock Letter at 5, Invesco Letter at 3, Virtu Letter II at 17.

1315 See, e.g., Citadel Letter I at 5-6 and BlackRock Letter at 5.

multiple price levels – even if quoted spreads are tight.[1316] Another commenter didn't articulate specific mechanism by which harms that might arise due to failing to take into account other criteria, but encouraged the Commission to take a "pragmatic approach" starting with a narrow set of "truly tick-constrained stocks" as defined by multiple criteria.[1317]

As discussed above, quoted spread reflects supply and demand forces in the market for liquidity provision. Many of the concerns of commenters regarding a smaller tick would be expressed by wider quoted spreads; for example, pennying could potentially reduce incentives for liquidity provision, raising quoted spreads. This argues in favor of quoted spread as the main criterion. Furthermore, it is unlikely that a stock which trades near $0.01 nearly all the time does so at random and would continue to do so even if unconstrained. It is more likely that a stock trading with a quoted spread at the minimum pricing increment nearly all the time does so because the stock would trade with a narrower spread if that was possible, but the minimum quoting increment constrains the spread. Finally, quoted spread is correlated with depth, volume, and price.[1318] For these reasons, it is likely that stocks with narrower quoted spreads will also have relatively high depth, and volume, and have lower prices. However, to fully address commenters' concerns, the Commission has provided additional, supplemental analysis that examines whether there is meaningful variation of the effect of a reduction of tick size within those stocks that have lower quoted spreads.

1316 See Invesco Letter at 3.

1317 See Cboe Letter II at 2, 6.

1318 Using WRDS Intra Day Indicators Data for all stocks priced over $5.00 without sym_suffix, the correlation between daily log quoted spread, log share volume, log price, and log average depth at the NBBO is -.39, .35, and -.49 respectively. See also Harris Letter at 7.

Specifically, the analysis presented in Table 9 explores the question of whether stocks with similarly narrow quoted spreads respond differently to the TSP tick size change when conditioning on other factors suggested by commenters, such as depth, volume, or price. In sum, our analysis does not find evidence supporting the hypothesis that a narrower tick size is likely to harm stocks when considering criteria such as depth, volume, or price in addition to the quoted spread. Instead, our analysis suggests that across most market quality metrics stocks with high and low price, volume, or depth respond in a similar magnitude and direction to the same tick size change. For some market quality metrics, one subset of stocks may not have a statistically significant response to the tick size change. However, in no cases do we observe that stocks with high or low price, volume, or depth respond in opposite directions with magnitudes that are statistically significant. Thus, we find no evidence of a benefit from adding criteria to the tick size determination that would compensate for the considerably greater complexity that such an addition would cause.

The analysis presented in Table 9 builds on the TSP analysis considered above, with a few modifications.[1319] First, for brevity, we only report findings for bin 1 and bin 2 stocks – i.e., those stocks with narrower quoted spreads – because the final Rule will similarly only affect stocks with less than 2 ticks intra-spread.[1320] We also only present quantile regressions. We obtain daily regular hours trading volume, value weighted average price, and depth at the NBBO information from WRDS Intraday indicators for all trading days in May and June 2018. We

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1319 See supra section VII.D.1.b.ii.

1320 The Proposing Release analysis divided stocks into four bins based on their prevailing quoted spreads prior to the conclusion of the TSP. The first bin is for stocks with quoted spreads ($0.00, $0.06). The second bin is for stocks with quoted spreads in the range ($0.06, $0.09). The third bin is for stocks that had quoted spreads of ($0.09, $0.15) or approximately 2-3 ticks intra at a $0.05 tick increment. The fourth bin is for stocks with quoted spreads greater than $0.15.

divide bin 1 and bin 2 stocks into quartiles based on their average volume, price, or depth at the NBBO. The analysis uses quantile (median) regressions[1321] to estimate the following difference-in-difference regression model separately for the high and low quartile samples:[1322]

$$Y_{j,t} = \alpha_0 + \alpha_P Pilot_j + \alpha_E Event_t + \beta\left(Pilot_j x Event_t\right) + \mu_{j,t}$$

By checking to see if market quality measures are affected differently for stocks with similarly narrow quoted spreads, but which have different depth, or price, or volume profiles, the analysis can show whether the effects of reducing the tick size depend on these additional characteristics in a manner that a quoted spread measure misses. The results are presented in Table 9. Panel A presents the analysis that considers the effect of trading volume on a stock's response to a reduction in the tick size. The analysis sorts and subdivides the treated and control stocks separately by volume into quartiles, and it then performs regressions on the top and bottom quartile of stocks separately. Columns one and two present the results for stocks with TWAQS less than or equal to $0.011, whereas Columns three and four present the results for stocks with TWAQS greater than $0.011 but less than or equal to $0.020. Columns one and three present the results for stocks in the bottom quartile of trading volume while columns two and four present the results for stocks in the highest quartile of trading volume. Panel B presents the same analysis as Panel A but where stocks are sorted by price, and Panel C does the same for

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1321 The primary advantage of quantile regressions is that they are less sensitive to outliers that can affect mean inference in OLS. Thus, median regressions provide additional robustness to the analysis and ensure that results are not driven by outliers.

1322 In this equation the variable Y denotes the response variable of interest such as quoted spread and depth. The subscripts j and t serve to index stocks and days respectively. α_0, α_p, α_e, and β are coefficients (to be estimated), and $u_{j,t}$ is the error term. $Pilot_j$ is an indicator variable that equals 1 if stock j was in the treatment group, or 0 if stock j was in the control group. $Event_t$ is an indicator variable which is equal to 1 if the day t was post the treatment event and equals 0 otherwise. Table 8 reports the difference-in-difference estimator of β for a different response variable Y across the different quoted spread bins.

depth at the NBBO. We consider the differential effect of the TSP on depth, quoted spreads, effective spreads, cancel-to-trade ratio, share of odd-lot volume, and realized spread.

Table 9: TSP Analysis Conditional on Volume, Price, and Depth at the NBBO

Panel A: Trading Volume

Quoted Spread Bin #	TWAQS ≤ $0.06		$0.06 < TWAQS≤ $0.09	
Volume	Low	High	Low	High
Depth (100 shares)	-0.95***	-1.24***	-0.59***	-0.87***
	(-11.81)	(-22.45)	(-8.58)	(-16.01)
Depth ($1,000)	-9.66***	-24.9***	-4.54***	-12.8***
	(-5.03)	(-8.89)	(-5.10)	(-7.43)
Quoted Spread ($)	-0.021***	-0.037***	-0.0097	-0.035***
	(-4.51)	(-23.01)	(-0.72)	(-6.57)
Relative quoted Spread	-0.0055***	-0.0044***	-0.00064	-0.0012
	(-3.71)	(-7.58)	(-0.39)	(-1.41)
Effective spread ($)	-0.028	-0.039***	0.015	0.027
	(-1.24)	(-3.49)	(0.29)	(0.76)
Relative effective spread	-0.0037	-0.0049***	0.0079	0.00059
	(-0.92)	(-3.43)	(0.83)	(0.91)
Cancel-to-trade	-1.31	9.54***	6.64**	7.58***
	(-0.59)	(6.67)	(2.35)	(6.45)
Share of odd-lot volume	0.00058**	0.0018***	0.00068	0.0020***
	(2.07)	(8.82)	(1.45)	(5.21)
Realized Spread	-0.013***	-0.013***	-0.0049	-0.0086***
	(-7.27)	(-23.69)	(-1.13)	(-7.39)
Relative Realized Spread	-0.0034***	-0.0016***	-0.000061	0.000100
	(-5.59)	(-5.34)	(-0.08)	(0.29)

Panel B: VWAP

Quoted Spread Bin #	TWAQS ≤ $0.06		$0.06 < TWAQS≤ $0.09	
Price	Low	High	Low	High
Depth (100 shares)	-1.13***	-1.15***	-0.56***	-0.70***
	(-12.70)	(-30.31)	(-6.22)	(-24.81)
Depth ($1,000)	-12.0***	-19.3***	-2.74*	-10.6***
	(-5.81)	(-11.28)	(-1.87)	(-10.04)
Quoted Spread ($)	-0.026***	-0.039***	-0.012	-0.031***
	(-7.76)	(-10.35)	(-1.21)	(-6.21)
Relative quoted Spread	-0.010***	-0.0014***	-0.0012	-0.00048***

	(-6.65)	(-4.50)	(-0.61)	(-4.74)
Effective spread ($)	-0.0064***	-0.056***	-0.013	-0.0020
	(-5.70)	(-3.79)	(-0.24)	(-0.05)
Relative effective spread	-0.0030	-0.0026***	0.0053	-0.00083
	(-0.99)	(-4.09)	(0.57)	(-0.80)
Cancel-to-trade	-1.90	11.4***	4.87*	6.66***
	(-0.94)	(8.21)	(1.81)	(6.11)
Share of odd-lot volume	0.00058***	0.0029***	0.00076	0.0013***
	(3.05)	(9.98)	(1.55)	(3.42)
Realized Spread	-0.016***	-0.014***	-0.0062	-0.011***
	(-14.61)	(-22.63)	(-1.59)	(-11.31)
Relative Realized Spread	-0.0057***	-0.00066***	-0.00035	-0.00022***
	(-9.15)	(-16.55)	(-0.38)	(-12.28)

Panel C: Depth at NBBO

Quoted Spread Bin #	TWAQS ≤ $0.06		$0.06 < TWAQS≤ $0.09	
Depth at the NBBO	Low	High	Low	High
Depth (100 shares)	-1.02***	-1.38***	-0.62***	-0.76***
	(-20.53)	(-18.62)	(-21.27)	(-7.94)
Depth ($1,000)	-10.4***	-26.4***	-7.67***	-9.26***
	(-9.46)	(-7.33)	(-16.76)	(-3.39)
Quoted Spread ($)	-0.031***	-0.032***	-0.014**	-0.021**
	(-6.24)	(-15.74)	(-2.44)	(-2.11)
Relative quoted Spread	-0.00072	-0.0098***	-0.00015	-0.0026
	(-1.15)	(-8.28)	(-0.55)	(-1.27)
Effective spread ($)	-0.038***	-0.031**	0.0049	-0.021
	(-3.37)	(-2.11)	(0.41)	(-0.39)
Relative effective spread	-0.0022***	-0.0078**	-0.00020	0.0055
	(-5.18)	(-2.05)	(-1.47)	(0.60)
Cancel-to-trade	5.83***	1.81	4.79***	6.10**
	(4.35)	(1.25)	(3.03)	(2.50)
Share of odd-lot volume	0.0028***	0.00097***	0.0014***	0.0015***
	(9.02)	(4.66)	(3.42)	(3.42)
Realized Spread	-0.012***	-0.016***	-0.0072***	-0.0082**
	(-8.60)	(-21.26)	(-5.60)	(-2.33)
Relative Realized Spread	-0.00074***	-0.0046***	-0.00013*	-0.00046
	(-5.69)	(-7.87)	(-1.76)	(-0.50)

* Panel A presents results for the sample sorted on trading volume, Panel B presents the results for price, and Panel C presents the results for depth at the NBBO. Within each bin, stocks are sorted based on their average trading volume, price, and depth at the NBBO during May and June 2018. Each regression is estimated using quantile (median) regressions. The 3 tables – one for each panel – present the effects of a reduction in minimum tick size from $0.05 to $0.01 cent on various quoting and trading outcome variables. A difference-in-difference regression with no control variables is estimated using data covering Control, Test Group 2, and Test Group 3 TSP stocks from 08/01/2018 – 11/30/2018. All observations are at the stock day level. The same model is used for all outcome variables. For each outcome variable Y_{jt}, the table presents only the difference in difference coefficient estimates

that indicate the effect of the TSP on the dependent variable. The outcome variables are: Depth ($1,000) is dollar value of depth at the NBBO measured in $1,000s. The quoted spread refers to the distance between the NBBO midpoint and the NBBO quote. The effective spread is the distance between the NBBO midpoint and the realized trade price; the realized spread is the distance between a future NBBO midpoint (5-minutes ahead) and the trade price. Relative spread measures are calculated as the spread scaled by the NBBO midpoint. The cancel-to-trade ratio is the daily number of order cancellations divided by the number of trades, for displayed orders. The odd-lot rate is the percentage of trades in a day which executed against an odd-lot quote. Share of odd-lot volume is the odd-lot rate reported in WRDS Intra Day Indicators and equals 100*(Odd lot Messages)/(Trades for Odd lots). Similar to the analysis in Table 8, stocks are divided into quoted spread bins based on average quoted spreads during May-June of 2018. Results are presented for only bin 1 and bin 2 stocks; see supra note 1268 for details on bin assignment. Regressions on the highest and lowest quartiles within each bin are performed; cells are darkly shaded if the regression estimates differ in sign between the highest and lowest quartiles within a bin, and cells are lightly shaded if the regression estimates agree in sign and in statistical significance between the highest and lowest quartiles within a bin. Depth (100 shares) is number of shares available at the NBBO in 100s. All data are Winsorized at the 1% and 99% level. The numbers in the () paratheses reflect t-statistics that are based on two-way stock-and-date clustered standard errors. Symbols *, **, and *** reflect statistical significance at 10%, 5%, and 1% type-1 error levels.

The results show that in most cases that there is relatively little disagreement in terms of how low and high characteristic stocks respond to the TSP. In Panel A, which presents results sorted based on trading volume, 10 out of the 20 pairs of regressions agree on both sign and statistical significance. A pair refers to the high and low quartile group for the same market quality outcome and the same quoted spread group – e.g., columns one and two are a pair, and three and four are a pair. This means that in 10 out of the 20 regression pairs run, high and low trading volume stocks had market quality responses to the change in the tick size that were in the same direction and were statistically different from zero. A further 8 out of the 20 pairs agree on sign, but not statistical magnitude. This means that while the point estimators from the regressions indicate that both high and low volume stocks had market quality responses in the same direction, either one or both groups experienced an effect that could not be measured to be statistically different from zero.[1323] Lastly, only 2 out of 20 pairs disagree on sign, but there are

[1323] A result that is not statistically significant does not directly imply that there is no effect. Rather it implies that the test did not find enough evidence to overturn the hypothesis of no effect. This could be because 1) there is actually no effect, or 2) because the test did not have sufficient power to identify an existing effect.

no cases where both effects reject the hypothesis of no effect. This means that while the coefficients for the effect of the reduction in the tick size on high and low volume stocks disagree in the direction of the effect, in at least one case the effect is not statistically distinguishable from zero.

The story is similar for Panel B which presents results for price. 11 out of 20 regression pairs agree on sign and statistical significance. A further 7 out of 20 agree on the sign of the effect though not necessarily statistical significance while only 2 out of 20 disagree on sign, but again in these cases neither result is statistically different from zero. Lastly in Panel C, which presents results for the sort based on depth at the NBBO, 14 out of the 20 regression pairs agree on sign and statistical magnitude, 4 out of 20 agree on sign, but not statistical magnitude, and only 2 pairs disagree on sign, but in these cases neither regression provides a statistically significant result.

This analysis does not support the idea that failing to include price, volume, or depth-based criteria when determining which stocks receive a smaller tick size is likely to produce significant harm. In most cases, the analysis suggests that market quality is likely to respond similarly to a reduction in the tick size for stocks that are both high or low volume, price, or depth. It is possible that in some cases, some of the positive anticipated effects discussed above may be mitigated for certain subgroups of stocks. We fail to find evidence that certain subgroups of stocks will be significantly harmed by the amendments when only considering the time weighted quoted spread when assigning tick sizes.

c. Effect on Message Traffic and Market Data

One commenter stated that, since "reducing the minimum pricing increments for quotations" will result in "significantly more quotation increments within a penny-wide spread

for a given security," these amendments will "significantly increase the capacity requirements for market participants to process these additional quotation messages."[1324] Specifically the commenters stated that the additional message traffic could impact CAT costs which they state was not analyzed by the Commission.[1325]

Commenters also stated that increased message traffic can increase market participants' technological needs in terms of computing and processing requirements.[1326] Some commenters stated that more message traffic could slow down markets as it would take more time for market participants to process the increased data, this could in turn disrupt trading strategies.[1327] Another commenter stated that increased message traffic would lead to increased technology costs in terms of server, processor, and storage requirements needed to deal with increased message traffic.[1328] One commenter stated that significant increases in message traffic can cause technological difficulties for the exchanges.[1329] Another commenter stated that increased message traffic would give an advantage to sophisticated algorithmic traders who have a greater capacity to manage the cost of the data and could better apply the data itself.[1330]

The Commission recognizes the potential for these costs articulated by the commenters, and considers the information provided. However, the Commission expects these effects, including the effect on CAT costs, to be mild. This conclusion stems from experience in options

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1324 See SIFMA Letter II at 21, stating that it is concerned about the impact of the amendments on "consolidated market data, capacity costs and CAT data requirements."

1325 See SIFMA Letter II at 21, 43; see also Citadel Letter II at 4-5 and FIF Letter at 10-12.

1326 See, e.g., BlackRock Letter at 5, GTS Letter at 5, FIF Letter at 1, 6-8, RBC Letter at 4, IBKR Letter at 5, Fidelity Letter at 17.

1327 See Tradeweb Letter at 2.

1328 See STA Letter at 6.

1329 See Budish Letter at 5.

1330 See, e.g., Goldman Sachs Letter at 8 and RBC Letter at 4.

markets, which, as discussed above, experience considerably more message traffic than equity markets without significant adverse effects.[1331] It also stems from research provided by commenters that gives a framework for estimating the increase in message traffic and the costs of such an increase which will now be discussed suggesting an estimated overall increase in technology costs to market participants of approximately 1%, and an estimated increase in CAT costs of approximately $4.1 million.

The amendments add one additional tick intra-spread for some stocks. The Commission expects the increase in message traffic from this increase to be mild. One commenter referenced research performed by one of the exchanges suggesting that each additional tick intra-spread adds 20% to message traffic.[1332] This research suggests message traffic could increase 20% for stocks receiving the smaller tick size. The Commission expects 74% of share volume to receive the smaller tick, and the remaining share volume to be unchanged by the amendments. Multiplying 74% by 20% suggests that, based on the information provided by commenter, it is reasonable to believe total message traffic may increase by about 15% due to the amendments.

Accordingly, the costs associated with this increased message traffic on most market participants are expected to be relatively small. One commenter estimated that the proposed rule would lead to an increase in total infrastructure costs of 10% due to increased message traffic.[1333]

1331 See discussion surrounding supra notes 239 to 250.

1332 See FIF Letter at 7 referencing Phil Mackintosh, More Ticks, More Messages (Oct. 27, 2022), available at https://www.nasdaq.com/articles/more-ticks-more-messages. The research provided by the exchange provided three data points, the baseline case with no increase in ticks, a 1:5 increase and a 1:10 increase which are associated with 0%,100% and 500% increase in message traffic. If message traffic is the variable on the vertical axis and the tick size change the horizontal axis, then all three of these data points fall on the line $\%\ \text{Increase in Message Traffic} = 0.2 * \text{Ticks Added Intra Spread}$. Substituting in the number 1, to indicate the number of ticks added intra-spread yields an increase in message traffic of 1.2, or a 20% increase.

1333 See Fidelity Letter at 17.

Using the above methodology we estimate that if the proposal would have led to an increase in message traffic related costs of 10%, as suggested by the commenter, and if the costs of message traffic are proportional to the increase in message traffic, then by this reasoning, the adopted amendments, which create fewer ticks, will be associated with an increased infrastructure costs of approximately 1%.[1334] Additionally, another exchange, commenting on the Proposing Release which had more and smaller ticks than the adopted amendments, estimated that the increase in message traffic due to the proposal would be relatively small compared to historical variation.[1335]

Commenters asked the Commission to estimate the effect of the tick size reduction on CAT costs via the mechanism of increased message traffic.[1336] The fourth quarter 2023 CAT cloud hosting services costs were $30.47 million, [1337] or $121.88 million if annualized. Further, a recent order approving an amendment to the NMS plan governing CAT stated that equity message traffic accounted for 23% of total CAT message traffic (with options traffic accounting

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1334 The proposal would have added 9 ticks for the stocks receiving the $0.001 tick size, 4 ticks for the stocks receiving the $0.002 tick size, and 1 additional tick for the stocks receiving the 0.005 tick. Using the methodology provided by the commenters suggesting that each additional tick would increase message traffic 20% relative to the baseline suggests that stocks receiving the $0.001 tick would have an estimated message traffic increase of 180%, for stocks receiving the $0.002 tick the estimated increase in message traffic would be 80%, and for stocks receiving that $0.005 tick the increase in message traffic would be 20%. Using the same methodology as used to create Table 7 to estimate the amount of trading volume that would have been associated with each of the proposed tick sizes based on 2023 data suggests that approximately 50% of trading volume would have received the $0.001 tick, approximately 25% of trading volume would have been associated with the $0.002. Combining these figures suggests that message traffic associated with the proposal would have increased approximately 125%. Thus, if a 125% increase in message traffic is expected to be associated with a 10% increase in infrastructure costs, then assuming that costs are proportional to message traffic, then a 15% increase in message traffic will be associated with just over a 1% increase in infrastructure costs associated with the amended Rule.

1335 See NYSE Letter II at 10-11.

1336 See FIF Letter at 10-12, SIFMA Letter II at 43.

1337 See Consolidated Audit Trail, LLC, 2023 Financial and Operating Budget, available at https://www.catnmsplan.com/sites/default/files/2024-01/01.17.24-CAT-Q4-2023-Budget-vs-Actual.pdf.

for the remainder).[1338] Thus, estimated CAT costs associated with equity message traffic equal $121.88 million*23% = $28.03 million. Under the assumption that CAT costs are linear in message traffic,[1339] an increase in equity message traffic of 15% would correspond to an increase in CAT costs according to the following formula: $28.03 million *15%(expected increase in message traffic) ≈$4.1 million. Based on this data, we estimate CAT costs would increase by an estimated $4.1 million per year due to increased equity message traffic associated with the smaller tick size. The CAT NMS Plan requires participants and industry members to fund the CAT. The funding model for the CAT NMS Plan allocates the costs to fund CAT among participants and the members of a national securities exchange or a member of a national securities association.[1340]

Commenters stated that a smaller tick size will fragment liquidity in the order book and reduce the displayed liquidity at the NBBO, which in turn reduces the information about liquidity available in the market for market participants who do not receive depth of book

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1338 See SEC, Joint Industry Plan; Order Approving an Amendment to the National Market System Plan Governing the Consolidated Audit Trail; Notice (Joint Industry Plan), Securities Exchange Act Release No. 98290 (Sep. 6, 2023), 88 FR 62628 (Sep. 12, 2023) at 62680 & n.1077.

1339 The relation between total CAT cost and volume is complex and driven by both volume and the complexity of processing the additional information and may not always be linear. See Letter from Brandon Becker, Chair, CAT NMS Plan Operating Comm., to Vanessa Countryman, Sec'y, SEC at 3 n.11 (Mar. 27, 2024), available at https://catnmsplan.com/sites/default/files/2024-03/03.27.24-Proposed-CAT-NMS-Plan-Amendment-Cost-Savings-Amendment.pdf. However, one commenter speaking generically about server and technology cost associated with message traffic stated that these costs were "proportional to the increase in message traffic." See FIF Letter at 9. Consequently, there is uncertainty regarding the exact relation between CAT costs and equity message traffic. However, to facilitate estimates of the effect of the amendments on CAT costs, the Commission makes the assumption that CAT costs are linear in message traffic – knowing that there is uncertainty regarding the exact relation. However, without some assumption about the relation between CAT costs and message traffic, no inference could be made. To the extent that CAT costs are convex or concave – rather than linear - in message traffic then the actual costs associated with the amendments would be higher or lower that what is estimated here.

1340 See Joint Industry Plan, supra note 1338.

information from proprietary data feeds.[1341] These commenters stated that this could increase reliance on and the subsequent cost of proprietary data products due to the increased need for the data and simply due to additional data points.

The Commission acknowledges that, in addition to lowering transaction costs, the amendments will likely also spread depth across more price points in the limit order book and reduce depth at the NBBO in some stocks with a 0.5 cent tick, which could increase the complexity and cost associated with sourcing liquidity for larger orders.[1342] However, the inclusion of odd-lot information in consolidated market data is anticipated to help to mitigate this effect, and the eventual inclusion of depth of book information in consolidated market data due to the implementation of the MDI Rules should also help mitigate this effect.[1343] Fragmentation of liquidity in the limit order book will increase the precision and usefulness of information about depth of book quotes and odd-lot quotes inside the NBBO for some stocks with a 0.5 cent tick because orders in these stocks will be displayed at half-penny increments rather than at penny increments, which provides more precise information.[1344] This will increase demand for depth of book data, which could cause more market participants that currently only subscribe to

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1341 See Citadel Letter I at 8, Virtu Letter II at 8, 10, Citigroup Letter at 4, SIFMA Letter II at 41-42, and Lewis Letter attached to Virtu Letter II at p 35. See also Lewis Letter attached to Virtu Letter II at 33 (pointing out that the need to manage increased message traffic could lead proprietary data feed to become more expensive independent of market participant reliance such data products). SRO fees are subject to the rule filing process under Exchange Act section 19(b) and Rule 19b-4. 15 U.S.C. 78s(b); 17 CFR 240.19b-4.

1342 See supra section VII.D.1.b.i (discussing the smaller tick size fragmenting depth across more price levels).

1343 After the MDI Rules are implemented, consolidated market data is expected to contain depth information for five price levels beyond the NBBO, which will help mitigate the effects of a reduction in displayed depth at the NBBO from a reduction in tick size. See MDI Adopting Release, supra note 10, at 18625-30 and 18755-59 for further discussions on the content and effects of MDI depth of book data.

1344 This could increase the usefulness of both exchange proprietary depth of book feeds and MDI odd-lot information and depth of book data relative to SIP data for stocks with a 0.5 cent tick. However, as discussed below, the usefulness of MDI depth of book data in comparison to exchange proprietary depth of book data may decrease for these stocks.

SIP data to purchase exchange proprietary depth of book feeds. It could also cause some market participants that only subscribe to SIP data and who previously would not have purchased MDI depth of book data or odd-lot information to decide to purchase one or both of these MDI data elements when they become available. The Commission acknowledges that the amendments could increase the cost associated with producing exchange proprietary data feeds and MDI data, but the cost increases may not be significant.[1345] Any changes in the prices of exchange proprietary data feeds would be subject to the SRO fee filing process.[1346]

After the MDI Rules are fully implemented, commenters stated that the amendments could decrease the benefits of MDI data, which will include depth of book data for prices with quotes that are five levels outside of the NBBO.[1347] The tick reduction will likely alter the information in MDI data for some stocks with a 0.5 cent tick, making MDI depth of book data less informative while increasing the informativeness of MDI odd-lot information. The tick reduction may generally result in MDI depth of book data showing information on fewer shares in the order book for some stocks with a 0.5 cent tick. More specifically, it may no longer include some information on orders that are $0.03 to $0.05 away from the NBBO in some stocks with a 0.5 cent tick.[1348] However, the effects of the loss of this information may not be

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1345 See supra note 1334 and accompanying text (estimating increased infrastructure costs of approximately 1% due to an increase in message traffic).

1346 SRO fees are subject to the rule filing process under Section 19(b) and Rule 19b-4. 15 U.S.C. 78s(b); 17 CFR 240.19b-4.

1347 SIFMA Letter II at 41-42 stated that the Rule, by making NMS data under MDI less competitive with proprietary feeds, will offset some of the benefits of the MDI Rules.

1348 The MDI NMS data includes information on five round lot price levels outside the NBBO. The tick reduction implies that the levels may be $0.005 apart from each other; without the tick reduction, the levels would be at least $0.01 apart. Therefore, the tick reduction may result in five levels that cover orders that are $0.025 outside the NBBO, whereas without the tick reduction the five levels would cover orders that are $0.05 outside the NBBO. It is possible that MDI NMS data will include depth that is greater than $0.025 outside the NBBO for stocks receiving a tick reduction—this is because each displayed level is

significant because the MDI depth of book data would still show five round lot price levels of depth and many market participants may not need more than five levels of depth of book information.[1349] Additionally, for stocks with a 0.5 cent tick, information about depth within $0.025 of the NBBO may be more valuable than information about depth that is deeper in the book (e.g., between $0.03 and $0.05 of the NBBO), because only a relatively small portion of marketable orders execute at prices outside the NBBO.[1350] Further, for stocks that have the $0.005 tick, MDI odd-lot information about odd-lots inside the NBBO will likely be more valuable because it will show these odd-lots on a finer grid—as long as the NBBO spread is $0.01 or more, the tick reduction allows investors using MDI NMS data to see odd-lots at finer half-penny increments. For stocks that retain the one cent tick size, the tick size amendments are unlikely to affect the informativeness of MDI depth of book data or odd-lot information because the amendments are unlikely to change the trading environment, including odd-lot quotes inside the NBBO and depth in the limit order book.[1351]

Commenters stated that reducing the tick size would make MDI data less competitive with exchange proprietary data feeds.[1352] The tick reduction may cause some market participants that currently utilize exchange proprietary depth of book feeds, and would have replaced them

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required to comprise at least one round lot worth of shares, and odd-lot orders will be aggregated with other orders to form a level with a sufficient number of shares (with the displayed price equaling the least competitive price among the aggregated orders). That is, if there is not enough liquidity at a given price point within $0.025 of the NBBO, then a price point further outside the NBBO will be displayed.

1349 See MDI Adopting Release, supra note 10, at 18625 nn.387, 388 (discussing levels of depth used in order routing and analysis finding that a significant percentage of the total notional value of all depth of book quotations for both liquid and illiquid stocks falls within the first five price levels).

1350 See MDI Adopting Release, supra note 10, at 18731 (discussing analysis showing that only a small percentage of orders execute outside the NBBO).

1351 See supra section VII.D.1.

1352 See, e.g., SIFMA Letter II at 41-42 and Citadel Letter I at 8.

with MDI depth of book data and odd-lot information if it was available at a lower cost,[1353] to no longer substitute MDI depth of book data and odd-lot information for proprietary feeds.[1354] Proprietary feeds will likely gain certain advantages over MDI depth of book data as a result of the tick reduction. First, self-aggregators and competing consolidators relying on MDI depth of book data may not be able to provide information on depth for orders that are between $0.03 and $0.05 away from the NBBO for some stocks that have been assigned a $0.005 tick size because the MDI depth of book data only provides data on depth at 5 round lot price levels. Second, in cases where there is insufficient liquidity at a given price level to form a round lot due to the reduction in the tick spreading liquidity out across more levels, self-aggregators and competing consolidators relying on MDI depth of book data will not be able to provide information on depth at each price point beyond the NBBO, but will rather only have information on liquidity that is aggregated over multiple price points to compose a round lot; proprietary feeds, on the other hand, can offer information on available liquidity at each price point. These two advantages may lead some market participants that would have substituted MDI depth of book data for exchange proprietary depth of book data, if it was available at a lower cost once it was implemented, not to do so due to the tick reduction. To the extent this occurs, it would result in a transfer from competing consolidators and the market participants who would have substituted

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[1353] In the MDI Adopting Release, the Commission stated that it believes that the total fees for the equivalent of consolidated market data are likely to decline because of the MDI Rules, but recognizes uncertainty about how the effective national market system plan(s) will set the fees for data content underlying consolidated market data offerings and how SROs will set the fees for connectivity necessary to receive the data content underlying consolidated market data as well as how the competing consolidators will price their services. See MDI Adopting Release, supra note 10, at 18772.

[1354] This would apply to both market participants that would have self-aggregated the MDI depth of book data and odd-lot information or purchased it from a competing consolidator. See MDI Adopting Release, supra note 10, at 18793-95 for discussions on market participants substituting consolidated market data for exchange proprietary feeds. However, as discussed above, demand for MDI depth of book data could increase for market participants that currently rely on SIP data.

MDI depth of book data for their proprietary feeds to exchanges, because these market participants will continue paying, and exchanges will continue to receive revenue, for their proprietary data feeds.[1355] On the other hand, to the extent that the tick size reduction increases the usefulness and demand for depth of book data —as discussed above—some market participants that currently rely on SIP data may be able to satisfy their increased data needs by purchasing MDI odd-lot information and depth of book data from a competing consolidator once the MDI rules are implemented.[1356]

d. Analysis of the Length of Evaluation and Operative Periods

The adopted amendments specify three-time periods that govern tick assignment.[1357] First are the periods that a new tick size is operative. The adopted rules update the tick size twice a year, so they set this period at six months. Second, the rules set the ticks based on two backward-looking three-month Evaluation Periods over which NMS stocks' TWAQS is measured; if the TWAQS is at or below $0.015 during this Evaluation Period, then the stock will be assigned a half-penny tick. Otherwise, it will receive a penny tick. Finally, there is a one-month gap between the Evaluation Period and the initiation of the subsequent tick size. The January through March Evaluation Period will determine the tick for the May through October operative period.

1355 See MDI Adopting Release, supra note 10, at 18793-95 for discussions on market participants substituting consolidated market data for exchange proprietary feeds and related transfers.

1356 See infra section VII.D.4.b for additional discussions of why low latency traders may not substitute odd-lot information from the exclusive SIPs for exchange proprietary feeds.

1357 See 17 CFR 242.612(a)(1), defining the evaluation period to assign a tick size as "(i) the three months from January through March of a calendar year and (ii) the three months from July through September of a calendar year during which the Time Weighted Average Quoted Spread of an NMS stock shall be measured by the primary listing exchange to determine the minimum pricing increment for each NMS stock," and 17 CFR 242.612(b)(1), and specifying the pricing increment will be operative "(a) the first business day of May for the Evaluation Period from January through March and continue through the last business day of October of the calendar year, and (b) the first business day of November for the Evaluation Period from July through September and continue through the last business day of April of the next calendar year."

Likewise, the July through September Evaluation Period will determine the tick for November through April of the subsequent calendar year.

Commenters highlighted a tradeoff with respect to the proposed backward-looking evaluation period. On one hand, a short period "uses the period immediately closest in time to measure securities' behavior to ensure that tick-constrained names are selected using the most recent and relevant basis…"[1358] On the other hand, a short period may place too much emphasis on idiosyncratic and unrepresentative events.[1359]

Commenters also highlighted a tradeoff regarding the proposed length of the operative period. Frequent updating will allow tick assignment to more quickly react to changes in the "market environment and individual stock behavior…";[1360] quicker updating would thereby "reduce how often and for how long a stock's tick size stays outside the optimal range."[1361] However, more frequent updating may impose costs in terms of adjustments to algorithms, operations, trading models and systems,[1362] customer complaints,[1363] and tick size oscillation.[1364]

Commenters also discussed the importance of a gap between the proposed evaluation period and the beginning of the subsequent tick size to give industry time to update systems and avoid disruptions.[1365] The proposal did not include a gap between the evaluation period and the

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1358 See NYSE Letter I at 4.

1359 See FIA PTG Letter II at 2, Optiver Letter at 2, and MMI Letter at 6.

1360 See NYSE Letter I at 4.

1361 See Pragma Letter at 6.

1362 See FIA PTG Letter II at 2, UBS Letter at 13, Citigroup Letter at 2, BlackRock Letter at 9, Hudson River Letter at 3, JPMorgan Letter at 4, Morgan Stanley Letter at 3, State Street Letter at 3, and MMI Letter at 6.

1363 See TradeStation Letter at 5.

1364 See Mitre Corp. Letter at 5 and MEMX Letter at 16.

1365 See RBC Letter at 3, T. Rowe Price Letter at 4, and IEX Letter I at 7. T. Rowe Price and IEX both suggested a 1-month gap. RBC suggested "an appropriate amount of time to be informed of any changes in order to implement them, and to minimize errors as much as possible."

subsequent tick size, so the Commission has evaluated the tradeoffs in response to commenters' concerns.

The Commission acknowledges, as it did in the Proposing Release,[1366] that quoted spreads are not static from day to day. It is possible that a stock could have a narrow quoted spread during an evaluation period, and thus be assigned a $0.005 tick, and then during the following operative period it could experience points in time where the quoted spread is much wider.[1367] Likewise, a stock could have a wide quoted spread during an evaluation period and therefore be assigned a $0.01 tick, yet subsequently trade with a narrower spread such that a $0.005 tick would be beneficial. The extent to which these outcomes occur will depend on the length of the evaluation period, the operative period, and the lag between the two.

The Commission evaluates the tradeoffs mentioned above by computing diagnostic statistics for many different combinations of evaluation and operative periods. The four panels of Table 10 each present different diagnostics: Panel A estimates the fraction of aggregate share volume that is misassigned to a tick of $0.01, Panel B estimates the fraction of aggregate share volume that is misassigned to a tick of $0.005, Panel C estimates the rates of false positives, and Panel D estimates the rates of false negatives. Table 10 is similar to Table 10 of the Proposing

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1366 See Proposing Release, supra note 11, at 80324.

1367 Likewise, two stocks with equal average quoted spreads may not be equally tick-constrained. For example, one stock with a $0.02 average quoted spread could have a $0.01 quoted spread 40% of the time while another has a $0.01 quoted spread 10% of the time. The effect of the Rule on market quality could differ in much the same way as the effects described in this paragraph. Additionally, some commenters inquired about how stock splits and reverse splits would be handled; see SIFMA Letter II at 42 and Virtu Letter II at 18. Stock splits and reverse splits can mechanically affect the bid-ask quoted spread and are not considered in the evaluation periods, thus it is possible that a stock could temporarily be misassigned to a tick size due to a split or reverse split. These effects would be temporary and would rectify in the next evaluation period. See supra section III.C.8 for further discussions of how tick sizes are assigned following a stock split or reverse split.

Release,[1368] which estimated in the context of the proposal the fraction of aggregate volume that would receive a tick reduction yet trade with too many intra-spread ticks during the subsequent three months. Table 10 herein extends this analysis by: computing a wider range of diagnostic statistics, computing the statistics on a rolling basis for a 4.5-year sample, computing the statistics for a wide variety of period lengths, and incorporating a one-month lag between the evaluation period and the implementation of the tick updates as provided for in the adopted amendments.

Each diagnostic in Table 10 is computed for sixteen combinations of evaluation and operative periods—four evaluation period lengths, and four operative period lengths. The evaluation period lengths include: one month, three months (as suggested in the proposal and finalized in the adopted amendments), five months, and twelve months.[1369] The operative period lengths include: one month, three months (as suggested in the proposal), six months (as in the adopted amendments), and twelve months.[1370] The calculations incorporate a one-month lag between the evaluation period and the implementation of the updated tick size – which was not part of the proposal but is part of the adopted amendments. Further, each diagnostic is computed

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1368 See supra note 11, at 80324.

1369 The evaluation periods in this analysis were chosen to cover a range of time periods for both the evaluation period and the operative effective period suggested by commenters who suggested time horizons ranging from monthly updating to annual updating, see, e.g., Pragma Letter at 6 BlackRock Letter at 9, FIA PTG at 2, UBS at 13. Although commenters suggested 6-month evaluation periods, the analysis here considers five-month evaluation period specifically so that the evaluation period would not encompass two tick regimes when combined with a six-month operative period and a one month lagged implementation. For example, consider the six-month operative period spanning May to October (which includes a one month lagged implementation); the next six-month evaluation period would span April to September, thus including two distinct tick regimes. The five-month evaluation period would only span May to September, which is wholly contained in the most recent operative period. An evaluation period that encompasses two tick regimes may be less informative of the appropriateness of the current tick assignment; therefore, Table 10 uses a five-month evaluation period instead of a six-month evaluation period.

1370 The operative periods were chosen to cover a range of intervals, and to fit evenly into a twelve-month calendar year. In this way, any changes to the tick size would occur in the same month(s) of each year.

for every month from January of 2018 to June of 2022. That is, the Commission simulates the tick assignment procedure on a rolling basis for every month of the 4.5-year sample and computes the diagnostics at every month.[1371] Each diagnostic is therefore computed under each of the sixteen combinations of periods and for each of the 54 months in the sample, for a total of 864 calculations per diagnostic. The panels in Table 10 summarize the diagnostics over the 54 months and present a single number for each of the sixteen combinations of periods.

The diagnostics computed in Table 10 are subject to the following caveat: they are estimated from historical data in which the access fee cap was set at 30 mils, and stocks were constrained by the $0.01 tick. The amendments will reduce the access fee cap to 10 mils for all stocks and will reduce the tick to $0.005 for stocks that maintain a TWAQS at or below $0.015 during the evaluation period. These changes are likely to have two opposing effects on quoted spreads: the reduction in the access fee cap will put upward pressure on quoted spreads, while the reduction in the tick will allow quoted spreads to fall below $0.01 for some NMS stocks.[1372]

This caveat implies that the estimates in Table 10 will be systematically different from the same statistics calculated with realized data—i.e., data after the rule is implemented. However, the purpose of the analysis in Table 10 is to detect patterns in how the diagnostics vary across combinations of evaluation and operative periods. These patterns are likely to be robust to the aforementioned caveat. For example, suppose the reduction in the access fee cap causes a

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[1371] For example, suppose the month is April 2018. To compute the statistics for an evaluation length of three months and an operative length of six months, the tick size for May 2018 through August 2018 is set by the symbol's TWAQS from January 2018 through March 2018. The statistics in the table are determined by symbols' trading during the May 2018 through August 2018 period (the operative period). This process is repeated for every month from January 2018 to June 2022, and the table summarizes results across all months.

[1372] See supra section VII.D.1.b.ii for a discussion of the effect of the reduction in the tick on quoted spreads, and section VII.D.2 for a discussion of the effect of the reduction in the access fee cap on quoted spreads.

stock's quoted spread to widen by 20 mils; this effect would occur whether the Evaluation Period is three months or twelve months, and whether the operative period is one month or six months, etc. Therefore, Table 10 can still inform the choice of evaluation and operative period. The subsequent discussion of Table 10 will further highlight when a diagnostic may be over- or under-estimated.

Panel A of Table 10 estimates the fraction of aggregate share volume that is misassigned to a tick size of $0.01. A stock's volume is misassigned to a penny tick if its average TWAQS is above $0.015 during the most recent evaluation period, yet trades with a TWAQS below $0.015 in the operative period. This trading volume would have benefited from a lower tick of $0.005 in those subsequent months and is therefore considered a false negative. The fraction of aggregate share volume that is a false negative is reported in panel A. Further, this fraction is reported for every combination of evaluation period and operative period.

Looking at the false negatives in Panel A, the table demonstrates that shorter periods tend to reduce the percent of volume that is misassigned to a $0.01 tick. One can pick any evaluation length shown in the table (1, 3, 5, or 12). For that evaluation length, the fraction of aggregate share volume that occurs with a $0.01 tick and maintains a TWAQS at or below $0.015 is increasing in the operative period. In other words, more frequent updating provides greater benefits, on average, for any choice of evaluation period. For example, an evaluation period of 3 months with a 1-month operative period will misassign 9.4% of trading volume to a tick of $0.01; if the same evaluation period is used but the tick is updated annually, then the fraction of misassigned trading increases to 12.9%. Similarly, one can pick any column corresponding to the operative period (1, 3, 6, or 12) and observe that the prevalence of false negatives is increasing

with the length of the evaluation period. These patterns are consistent with commenters' views that more recent (and relevant) data tend to increase the benefits of the amendments.

A tick size can be misassigned in a second way: a stock may be assigned a tick of $0.005 yet end up trading with an average quoted spread over $0.015. This trading volume may not fully benefit from the lower tick and is therefore considered a false positive. If the quoted spread widens sufficiently, relative to the quote, then the stock could trade in a range of ticks intra-spread that may harm market quality.[1373] The fraction of aggregate volume that is a false positive is reported in Panel B of Table 10 for every combination of evaluation period and operative period. This is analogous to Table 10 of the Proposing Release, but with a quoted spread threshold of $0.015 instead of 10 or 15 ticks to align with the adopted amendments.

Panel B shows that, for the adopted rule choices of a 3-month Evaluation Period and a 6-month operative period, 3.4% of share volume will receive a $0.005 tick yet trade in an environment with an TWAQS over $0.015. It is possible that the reduction in the tick size could cause a worse trading environment for some of this fraction of trading volume, compared to what the trading environment could have been had the stock retained a $0.01 tick. This effect will not be indefinite because, if a stock's quoted spread remains elevated, then at the end of the next evaluation period the stock will be assigned a wider tick—mitigating the negative consequences of having a tick size that is too narrow relative the quoted spread.

[1373] The empirical analysis in section VII.D.1.b.ii, suggesting that a lower tick size benefits tick-constrained stocks, is an "on average" result. While the Commission expects that a lower tick would on average decrease transaction costs for tick-constrained stocks, the Commission cannot rule out the possibility that for some of these stocks, a smaller tick could lead to wider quoted spreads. For these stocks, if quoted spreads increase to a sufficient degree, then the stock could be re-assigned a wider tick after the next evaluation period.

The false positive statistics in Panel B of Table 10 further show that less frequent tick updating tends to result in more volume trading with a smaller tick yet a relatively wide quoted spread. This can be seen by the increased prevalence of false positives as one moves left-to-right along a row—for any chosen evaluation period, a longer operative period results in more volume trading at a low-tick yet relatively wide quoted spread. This pattern is consistent with commenters' views that more frequent updating is better at adapting to changing market trends and stock behavior. Similarly, moving down any given column shows that increasing the evaluation period tends to reduce the amount of volume in low-tick stocks with wide quoted spreads; this pattern is consistent with commenters' views that short evaluation periods may, in some circumstances, assign stocks to the $0.005 tick on the basis of transient events, and that these stocks may not be able to sustain the tick reduction.

The estimates of false positives in Panel B of Table 10 are likely to be over-estimates for two reasons. First, the threshold for tick misassignment is chosen at a quoted spread of $0.015, which corresponds to three intra-spread ticks. The above analysis on the Tick Size Pilot indicates that the trading environment does not deteriorate until the number of intra-spread ticks is well above three. Hence, the chosen threshold is conservative. Second, and as previously discussed, the estimates in Panel B are constructed from historical data in which stocks were constrained by the $0.01 tick. Once these amendments are implemented the stocks assigned a $0.005 tick will be able to trade at quoted spreads below $0.01; this will have a mechanical effect of lowering the stocks' TWAQS and thereby keeping more volume under the $0.015 quoted spread threshold.

By comparing the magnitudes of the false negatives and false positives in Panels A and B of Table 10, we can assess the relative importance of the two ways in which a tick may be misassigned. The false negatives are generally substantially larger and exhibit greater variation

within the table.[1374] This implies that the incremental effect of the choice of period length will be greater for the share of volume that is misassigned to a $0.01 tick than for volume that is misassigned to a $0.005 tick. For example, the difference between the highest and lowest fraction of false negatives is 12.3%--this is the increase in aggregate share volume at a misassigned $0.01 tick when moving from 1-month periods to 12-month periods—while the difference between the highest and lowest fraction of false positives is only 1.8% of aggregate share volume.[1375]

An advantage of Panels A and B of Table 10 is that they estimate the prevalence of false negatives and positives as fractions of aggregate share volume; these panels therefore show the amount of aggregate trading that is misassigned to a tick. A disadvantage of Panels A and B is that they do not condition on the aggregate level of quoted spreads. Some combinations of evaluation and operative periods may do relatively well when aggregate quoted spreads are high, and some combinations may do better when aggregate quoted spreads are low.[1376]

1374 If false positives are over-estimated, as discussed in the previous paragraph, then the relative importance of false negatives becomes greater still.

1375 The greater prevalence of false negatives may be due to the existing $0.01 tick size effectively censoring the observed quoted spreads at the penny tick. For symbols near the $0.015 threshold, the prevalence of false positives and negatives should be approximately equal—i.e., a symbol with a quoted spread of $0.0149 is as likely to cross over the $0.015 threshold (and be a false positive) as a symbol with a quoted spread of $0.0151 is likely to cross under the $0.015 threshold (and be a false negative). When we move away from the threshold, however, the low-tick symbols are more likely to be constrained by the penny tick—if we see a TWAQS of $0.012, the true market-clearing quoted spread —i.e., unconstrained by the minimum tick—is likely lower than $0.012 because the TWAQS is censored at $0.01; if we see a TWAQS of $0.018, however, this censoring is less important. Therefore, the likelihood that a symbol with a TWAQS of $0.012 crosses over the $0.015 threshold (and is recorded as a false positive) is lower than the likelihood that a symbol with a TWAQS of $0.018 crosses under the $0.015 threshold (and is recorded as a false negative).

1376 To take an extreme example, suppose every stock's quoted spread increases by $0.10 immediately after new ticks are assigned. This implies that no stock should have a tick of $0.005. In this case, the evaluation and operative periods that assign the least amount of trading to the $0.005 would do best. Conversely, suppose that quoted spreads fall by half immediately after new ticks are assigned; in this case, the periods that assign more trading to the $0.005 tick would generally do better.

Panel C and D of Table 10 address the aforementioned disadvantage of Panels A and B by estimating rates of false negatives and positives. The false negative rate conditions on the amount of low- quoted spread volume, while the false positive rate conditions on the amount of high- quoted spread volume.[1377] Specifically, the rate of false negatives is measured as the amount of share volume that occurs with a tick of $0.01 and a TWAQS under $0.015, divided by the total amount of share volume that occurs with a TWAQS under $0.015. Analogously, the rate of false positives is measured as the amount of share volume that occurs with a tick of $0.005 and a TWAQS over $0.015, divided by the total amount of share volume that occurs with a TWAQS over $0.015. In the context of the evaluation period, a low false negative rate signifies effective identification of stocks that would benefit from a tick reduction, while a low false positive rate suggests effective avoidance of assigning a reduced tick to stocks that would not benefit from it. In contrast to Panels A and B, patterns in Panels C and D of Table 10 are likely to be more robust to market-wide changes in quoted spreads.

Panel C of Table 10 presents results for the false negative rates across 16 combinations of evaluation periods and operative periods. The pattern for false negative rates is similar to the fraction of share volume inappropriately assigned a $0.01 tick in Panel A—as the period lengths shorten, the false negative rates decrease. For example, an evaluation period of 3 months with monthly updating typically fails to assign a tick reduction to 12.8% of volume that would benefit from it. If the same evaluation period is used but the tick is updated annually, then the rule would fail to assign a tick reduction to 19.3% of volume that would benefit from it. The pattern holds moving down columns and moving across rows from shorter to longer periods. This lends

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[1377] In the statistics and medicine literature, the false positive rate is related to a test's specificity, while a false negative rate is related to a test's sensitivity.

support to commenters' views that more recent data—from shorter evaluation periods and more frequent updating—tends to do a better job at assigning a low tick to stocks that will benefit from it in the operative period.

False positive rates are reported in Panel D. The pattern for false positive rates is consistent with results in Panel B on the fraction of volume inappropriately assigned a $0.005 tick—shorter evaluation periods and longer operative periods tend to have higher false positive rates, indicating that more trading is potentially harmed from having too narrow of a tick. For every column, the highest false positive rate occurs with an evaluation length of 1 month, and the lowest false positive rate occurs with an evaluation length of 12 months. This indicates that short evaluation periods may put more weight on transient events, as some commenters stated. Similarly, for every row the false positive rate is highest with an operative period of 12 months, and the rate is lowest with an operative period of 1 month. This indicates that infrequent updating increases the risk that a stock is stuck at an inappropriately low tick for many months.

The contrasting patterns in the rates of false positives and negatives illustrates a tradeoff highlighted by commenters (and discussed at the beginning of this section). A short evaluation period uses the most recent and relevant information, which on average reduces the false negative rate; however, a short evaluation period also places more emphasis on short-term and volatile events, which raises the false positive rate.

Table 10: Effect of the evaluation period on inappropriate tick assignment

Panel A: Fraction of aggregate share volume assigned a $0.01 tick with a subsequent TWAQS below $0.015 (i.e., false negatives)

		Length of operative period in months			
		1	3	6	12
Length of evaluation period in months	1	8.5%	9.4%	10.7%	12.9%
	3	11.4%	12.4%	13.7%	15.8%

	5	13.1%	14.1%	15.3%	17.3%
	12	17.0%	17.8%	18.9%	20.8%
Panel B: Fraction of aggregate share volume assigned a $0.005 tick with a subsequent TWAQS above $0.015 (i.e., false positives)					
		Length of operative period in months			
		1	3	6	12
Length of evaluation period in months	1	3.1%	3.3%	3.8%	4.3%
	3	2.6%	2.9%	3.4%	3.8%
	5	2.6%	2.9%	3.2%	3.6%
	12	2.5%	2.7%	2.9%	3.2%
Panel C: False negative rates					
		Length of operative period in months			
		1	3	6	12
Length of evaluation period in months	1	12.8%	14.2%	16.2%	19.3%
	3	17.4%	18.8%	20.6%	23.6%
	5	19.9%	21.2%	23.0%	25.9%
	12	25.7%	26.9%	28.6%	31.2%
Panel D: False positive rates					
		Length of operative period in months			
		1	3	6	12
Length of evaluation period in months	1	8.5%	9.4%	10.9%	12.6%
	3	7.2%	8.2%	9.6%	11.2%
	5	7.1%	8.1%	9.3%	10.6%
	12	6.8%	7.5%	8.4%	9.5%

[a] For every month from January 2018 to June 2022, the Commission simulates the tick assignment procedure under 16 combinations of evaluation and operative period lengths. The evaluation period determines the number of prior months to use when averaging each stock's quoted spread; a TWAQS of $0.015 or below during the evaluation period causes the stock to receive a tick of $0.005 during the subsequent tick assignment interval. The operative period determines the length of each tick assignment.

All the statistics in the tables are computed using data beginning one month after the evaluation period. For example, suppose the month is April 2018. To compute the statistics for an evaluation

length of 3 months and an operative length of 6 months, the tick size for May 2018 through August 2018 is set by the stock's TWAQS from January 2018 through March 2018. The statistics in the table are determined by stocks' trading during the May 2018 through August 2018 period (the operative period). This process is repeated on a rolling basis for every month from January 2018 to June 2022, and the table summarizes results across all months.

TWAQS is determined by computing the time-weighted quoted spread during regular trading hours as computed by the WRDS intra-day indicators for every sym_root and sym_suffix combination in the dataset. When calculating a stock's TWAQS during an evaluation period, the stock's daily TWAQS is averaged across all trading days in the evaluation period.

When assigning volume to a TWAQS bucket in an operative period, the TWAQS on a given day for a particular stock is used. That is, if a stock trades with a TWAQS of $0.011 on Monday but the same stock has a TWAQS of $0.016 on Tuesday, then its volume on Monday is assigned to the sub-$0.015 category while its Tuesday volume is assigned to the over-$0.015 category in the operative period.

The universe of securities in the WRDS intra-day indicators dataset is used.

Panel A computes the fraction of total aggregate share volume that occurs in stocks that would have been assigned a $0.01 tick yet subsequently trade at a TWAQS of under $0.015 in the operative period. These stocks would benefit from a $0.005 tick instead of a $0.01 tick.

Panel B computes the fraction of total aggregate share volume that occurs in stocks that would have been assigned a $0.005 tick yet subsequently trade at a TWAQS of over $0.015 in the operative period. These stocks may not benefit from the $0.005 tick.

Panel C computes false negative rates. The false negative rate is the fraction of share volume that is assigned a tick of $0.01 among the share volume that trades with a TWAQS under $0.015 in the operative period.

Panel D computes the false positive rates. The false positive rate is the fraction of share volume that is assigned a tick of $0.005 among the share volume that trades with a TWAQS above $0.015 in the operative period.

Table 11 further explores commenters' discussions about the risk of placing too much emphasis on transient market conditions. In particular, Panels A and B of Table 11 computes rates of false negatives and positives—similar to panels C and D of Table 10—but does so using only the evaluation period that ends with March of 2020. The one-month evaluation period includes only March of 2020; the three-month evaluation period covers January to March of 2020; the five-month evaluation period covers November of 2019 to March of 2020; the twelve-

month evaluation period covers April of 2019 to March of 2020. In this way, Panels A and B of Table 11 demonstrate what may happen if an unusual market event causes an inappropriate tick assignment. These panels show that a one-month evaluation period performs particularly poorly when that month is March of 2020. Specifically, the one-month evaluation period exhibits a substantially higher false negative rate.[1378] A three-month evaluation period consistently has the lowest false negative rate—it has the benefit of recent data without an over-reliance on short-term fluctuations. Finally, the false positive rates in Panel B approximately double when moving from a six-month operative period to a twelve-month operative period, indicating that infrequent tick updating can lead to stocks getting stuck with an inappropriately low tick for an extended period.

Panels A and B of Table 11 add to our understanding of the tradeoff presented by the evaluation period. Table 10 suggests that short evaluation periods tend to reduce false negatives but increase false positives. Given that false negatives (vs. false positives) tend to be more prevalent and vary more across evaluation periods, Table 10 suggests that a one-month evaluation period may be best. However, Table 11 shows that a one-month evaluation period may substantially increase false negatives when the evaluation period includes a period of unusual market stress.

While Panels A and B of Table 11 includes March of 2020 in the evaluation period, one commenter also provided, in the context of the Proposing Release, analysis using March of 2020 in the operative period. This commenter stated that during times of market stress, "many symbols would be trading with far more price levels intra-spread than contemplated under the Proposal,

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[1378] The false positive rates are generally lower than usual (e.g., below those in Panel B), likely because quoted spreads narrowed after March of 2020.

thereby further increasing the liquidity-related harms…" The commenter further showed that, were the proposed rule in effect, most symbols receiving a tick reduction would have experienced over ten intra-spread ticks during March of 2020, and many stocks would have experienced over twenty intra-spread ticks.[1379]

The Commission acknowledges that quoted spreads generally widen during periods of market stress, and this may result in stocks trading with more intra-spread ticks than is desirable; the rise in intra-spread ticks may then compound the market stress. Relative to the proposal, the amendments reduce the severity of such an outcome by reducing the number of stocks that receive a tick reduction, and by reducing the size of the tick reduction. To further examine this issue, the Commission conducts its own analysis with March of 2020 as the operative period. In particular, the Commission simulates tick assignment in February of 2020 under the parameters of the amendments, and then examines the outcome during March of 2020. The simulation is done for a range of evaluation periods—a one-month evaluation period uses January of 2020 to determine which stocks receive the $0.005 tick in March (allowing for a one-month lag), a three-month evaluation period uses November of 2019 to January 2020 to assign ticks, a five-month evaluation period uses September of 2019 to January 2020, and a twelve-month evaluation period uses February of 2019 to January 2020. The Commission then examines the fraction of aggregate share volume that would have received a $0.005 tick under the amendments yet traded with a wide quoted spread during an operative period of March 2020.

Results are presented in panel C of Table 11. Each row corresponds to an evaluation length of 1, 3, 5, or 12 months. Each column corresponds to a quoted spread threshold of $0.015,

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[1379] See Citadel Letter I at 6-7.

$0.02, or $0.05. The upper-left number—21.4%—indicates that 21.4% of aggregate share volume in March of 2020 would have occurred with a $0.005 tick and a TWAQS over $0.015. With a three-month evaluation period, this fraction halves to 10.6%, further reinforcing the conclusion of Panel A that a one-month evaluation period may do particularly poorly when market conditions suddenly worsen. The Commission further reiterates that stocks receiving a $0.005 tick are unlikely to be harmed when trading at a quoted spread of $0.015, so it is unlikely that 10.6% of share volume would have been harmed in March of 2020 were the amendments in place. To further explore this issue, the Commission performs similar calculations with wider quoted spread thresholds of $0.02 and $0.05. With a three-month evaluation period, the fraction of aggregate share trading that receives a $0.005 tick and trades at a quoted spread over $0.02 is 6.4%; this reduction (from 10.6% trading at a quoted spread over $0.015) indicates that a substantial proportion of the false positive trading during March of 2020 is occurring with 3-4 intra-spread ticks, which is generally in line with commenters' views on the optimal number of intra-spread ticks.[1380] Finally, with a three-month evaluation period, the fraction of aggregate trading that receives a $0.005 tick and trades at a quoted spread over $0.05 is 1.2%. Analysis in the Proposing Release and herein suggests that this 1.2% of volume is at an increased risk of a reduction in market quality due to having over ten intra-spread ticks.[1381]

Table 11: Effect of the evaluation period on inappropriate tick assignment around March 2020				
Panel A: False negative rates using March of 2020 in the evaluation period				
	Length of operative period in months			
	1	3	6	12

[1380] See supra note 1299.

[1381] See supra section VII.D.1.b.ii, particularly Figure 2 and surrounding discussion.

Length of evaluation period in months	1	36.2%	35.4%	37.4%	40.1%
	3	21.7%	22.5%	23.7%	23.9%
	5	34.7%	34.9%	36.1%	37.4%
	12	30.0%	31.7%	32.0%	33.9%

Panel B: False positive rates using March of 2020 in the evaluation period

		Length of operative period in months			
		1	3	6	12
Length of evaluation period in months	1	1.7%	2.6%	3.2%	8.0%
	3	3.0%	4.6%	6.0%	12.0%
	5	2.6%	4.1%	5.4%	10.2%
	12	3.6%	5.0%	6.5%	11.0%

Panel C: Fraction of March 2020 share volume with a $0.005 tick and wide quoted spreads

		Quoted spread threshold		
		AQS > $0.015	AQS > $0.02	AQS > $0.05
Length of evaluation period in months	1	21.4%	14.4%	3.5%
	3	10.6%	6.4%	1.2%
	5	12.4%	7.6%	1.5%
	12	14.4%	9.2%	2.0%

[a] The Commission simulates the tick assignment procedure under 16 combinations of evaluation and operative period lengths. The methodology and data used for this simulation is described in the note to Table 10.

In contrast to Table 10, which performed the simulation on a rolling basis for every month from January 2018 to June 2022, this table only simulates tick assignment and outcomes around March of 2020.

Panel A repeats the false positive calculations of Table 10 as if the tick is assigned in April 2020 (to ensure that March 2020 is in the evaluation period). For example, to compute the statistic for an evaluation length of 3 months and an operative length of 6 months, the tick size for May 2020 through August 2020 is set by the stock's TWAQS from January 2020 through March 2020. April 2020 is the hypothetical month in which the tick assignment is calculated and acts as the gap between the evaluation period and the operative period. Panel B similarly repeats the false negative calculations of Table 10 as if April 2020 is the month in which the tick assignment is calculated.

Panel C instead uses March 2020 as the operative period. For example, to compute the statistic for an evaluation length of 3 months, the tick size for March 2020 is assigned by the stock's TWAQS from November 2019 to January 2020, with February of 2020 being the hypothetical month in which the tick assignment is calculated. Panel C computes the fraction of total aggregate share volume that occurs in stocks assigned to a $0.005 tick, yet trades at a high TWAQS during March of 2020. The fraction is calculated using a range of TWAQS thresholds for trading during March of 2020—the columns correspond to trading with a TWAQS over $0.015, $0.02, and $0.05.

The analysis indicates that a shorter operative period almost always results in fewer errors. By updating the tick more frequently, the tick better reflects changing market conditions—this is shown by increasing rates of both false negatives and positives as the operative period widens.[1382] However, commenters stated that more frequent updates may impose costs in terms of adjustments to algorithms, operations, systems, and an increase in customer complaints. One commenter requested that the Commission "investigate historical rates of change in the TWAS for a variety of trading symbols. This would avoid imposing undue costs on market participants that may be caused by tick size updates that are too frequent but should mitigate the possibility that tick sizes do not update frequently enough and lead to worse trading outcomes."[1383]

The Commission examines the frequency of tick size updates in Table 12. This table shows the typical number of tick-changes that occur in a 12-month period under each combination of evaluation and operative period length.[1384] Shorter operative periods present a

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1382 In Panels A-D of Table 10 and Panels A-B of Table 11, moving left-to-right along any row results in a monotonic increase in both false positives and false negatives. The only exception to this pattern is in Panel A of Table 11: with an evaluation period of one-month, the false negative rate falls by 0.8% when the operative period increases from one to three months.

1383 See Mitre Corp. Letter at 5.

1384 These estimates of tick changes are likely to be over-estimates because the estimates are constructed from historical data in which stocks were constrained by the $0.01 tick. Once the adopted tick amendment is implemented, the stocks assigned a $0.005 tick will be able to trade at quoted spreads below $0.01; this is

tradeoff, they better tailor the tick size to current conditions for the stock which can improve market quality for the stock, but they impose two costs: first, a shorter operative period implies ticks are updated more frequently during a year, which increases the number of discrete system changes that market participants need to make. Second, a shorter operative period increases the number of tick-changes that stocks experience during a typical twelve-month period—this is seen in Table 12 by the increase in tick changes as one moves right-to-left in any row. More tick changes may result in result in more extensive changes to trading algorithms and may increase customer confusion and complaints. The risk of customer confusion is mitigated by the adoption of a tick size indicator in the regulatory data. This indicator can be directly incorporated into trading algorithms helping to automate the process adjusting trading strategies to different tick sizes for algorithmic traders.[1385]

Table 12: Effect of the evaluation period on the median number of tick changes over a 12-month period

		Length of operative period in months			
		1	3	6	12
Length of evaluation period in months	1	4,722	2,317	1,356	665
	3	2,632	1,969	1,253	653
	5	1,724	1,435	1,153	622
	12	772	680	591	488

[a] The Commission simulates the tick assignment procedure under 16 combinations of evaluation and operative period lengths. The simulation is performed on a rolling basis for every month from January 2018 to June 2022. The methodology and data used for this simulation is described in the

expected to lower the stocks' TWAQS, thereby reducing the probability that a low-tick stock will experience a tick change by crossing over the $0.015 TWAQS threshold. It is possible, however, that the amended rule's reduction in the access fee cap may cause quoted spreads to widen, though transaction costs are not expected to go up, and thus shift the distribution of quoted spreads toward the $0.015 threshold; if more stocks trade near the $0.015 threshold, then there may be more switching as stocks move across the threshold more frequently.

1385 See infra section VII.D.5 for additional discussion of the expected costs associated with the amendments to Rule 612.

note to Table 10. This table computes the number of tick changes that occur over a median 12-month horizon for each combination of evaluation and operative period length.

To summarize the results of this subsection, Tables 10, 11, and 12 illustrate the tradeoffs inherent in the choice of evaluation and operative periods. With respect to the evaluation period, Table 10 implies that shorter period lengths reduce false negatives but increase false positives; the higher prevalence of false negatives tilts the scale toward a short evaluation period. Table 11, though, shows that a one-month evaluation period may unduly increase the influence of aberrant events, while a three-month evaluation period continues to perform well in unusual market conditions.

With respect to the operative period, Tables 10 and 11 imply that shorter period lengths reduce both false negatives and positives. Table 11 shows a particularly large reduction in false positives when using a six-month operative period instead of a twelve-month period. Focusing on an evaluation period of three-months, Tables 10 and 11 show similar error rates with operative period of three and six months. However, a three-month operative period requires market participants to update their systems twice as often as a six-month period, and Table 12 shows that the number of annual tick changes increases 57% when moving from the six-month to the three-month period.[1386] The amendments, which adopt a three-month Evaluation Period and a six-month operative period, reflect these considerations.[1387]

Finally, the Commission examined the effect of a one-month lag between the end of the evaluation period and the subsequent tick assignment. All the results in Tables 10, 11, and 12

[1386] With a three-month evaluation period, a six-month operative period results in 1,253 annual tick changes, while a three-month operative period results in 1,969. The increase is therefore calculated as: (1969 – 1253)/1253 = 57%.

[1387] See 17 CFR 242.612(a)(1), (b)(1) for rule text relating to these periods.

include this one-month lag; the Commission separately calculated Table 10 statistics without the lag. If the lag is removed, then the error rates in Panels A and B of Table 10 fall by a small amount across all combinations of evaluation and operative periods. The lag effectively makes the evaluation period less informative about the operative period, and this effect is stronger when updates are made every month. With respect to magnitudes, removing the lag causes the fraction of trading that is a false negative to decrease by an average of 0.9% with a maximum decrease of 1.2% for the top left cell of Panel A; the false positives in Panel B likewise drop by an average of 0.2% when the lag is removed. On the other side of the scale, the lag may reduce operational burdens on market participants by allowing them time to update their systems before a new tick assignment occurs, and may likewise provide brokers time to give advance notice to customers about which stocks will experience tick changes.[1388] The amendments, which provide a one-month lag, reflect a conclusion that the cost of increased error rates due to the one-month lag is small relative to the benefits that the lag provides for industry testing and adjustment.

e. Additional Effects of a Half-Penny Tick

Some commenters suggested, in the context of the proposal, that a tiered tick size could create confusion in the markets particularly for retail traders.[1389] These commenters stated that retail traders may be at a relative disadvantage because they may get confused by the sub-penny increments. One commenter presented data suggesting that retail traders tend not to use sub-penny non-marketable limit orders even when they can, for instance for orders priced below

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1388 The adopted rule additionally syncs the dates of tick assignment with the dates of new round lot assignments. This further reduces operational burdens on market participants. See discussion in section VII.D.5.a.

1389 Fidelity Letter at 3; Tastytrade Letter at 18-19.

$1.00, and that fill rates for such trades tend to go down for retail traders.[1390] The commenter ascribes these findings to retail investors getting confused and being unfamiliar with sub-penny trading increments leading to a competitive disadvantage for these traders with respect to more sophisticated traders that are more familiar with sub-penny increments and thus retail traders using non-marketable limit orders would be more likely to be undercut with a smaller tick.[1391] Another commenter suggested that retail investor confusion would lead retail brokers to need to hire additional staff to manage customer confusion and education concerning multiple tick sizes, or to handle phone trades by retail customers confused by the markets.[1392]

The Commission acknowledges some potential for confusion but does not expect the amendments to disadvantage retail traders. First, the comments are in response to the proposal; the adopted amendments have fewer minimum quoting increments than the proposed amendments; indeed, there are only two as opposed to four. Second, any confusion or disadvantage must be evaluated relative to the baseline. Currently the penny tick creates a price floor, which, especially for tick-constrained stocks, advantages faster and generally more sophisticated traders. It also creates incentives for more complex strategies such as those involving alternative venues, again, contributing to complexity and putting less sophisticated investors at a disadvantage. Third, the one-month period of time between measuring the TWAQS and the assigned tick size becoming operational will allow time for broker-dealers to educate

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1390 See Fidelity Letter at 3.

1391 See also O'Brien Letter at 4 and Tastytrade Letter at 20 making similar comments.

1392 See Tastytrade Letter at 18-19.

customers about tick sizes.[1393] For these reasons, the half-penny tick is not expected to disadvantage retail traders.

One commenter requested that the Commission consider how a smaller tick size could affect stock splits.[1394] The commenter cited academic research suggesting that stock splits can be used to affect the bid-ask spread.[1395] To the extent that issuers engage in stock splits to manage their quoted spread, this behavior is likely to continue under the amended rules when issuers believe that a stock split could improve their liquidity. However, the amendments are expected to improve liquidity on average for stocks subject to the smaller tick size, so it may be less likely that an issuer may feel the need to manage liquidity via stock splits going forward and so there could be fewer associated stock splits for this reason. Furthermore, although stock splits and reverse splits can mechanically affect the bid-ask quoted spread and change the optimal tick, the next evaluation period would rectify any misalignment in the stock's tick size assignment.[1396]

Some commenters requested that the Commission provide an analysis of the effect of the amendments on the use of ISOs (intermarket sweep orders).[1397] Some stated that spreading liquidity over more price levels would increase the risk of information leakage with regards to a large order being split over many smaller orders which would lead to an increased complexity of implementing large orders and would thus lead to an increased use of ISO orders.[1398] Barardehi

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1393 See supra note 307 and surrounding text.

1394 See CCMR Letter at 28-29.

1395 See James J. Angel, Tick Size, Share Prices and Stock Splits, 52 J. FIN. 655 (1997), and Sida Li & Mao Ye, supra note 1286.

1396 See supra section VII.C.1.c for additional discussion of tick sizes, quoted spreads, and stock splits. See supra note 1367 and supra section III.C.8 for discussions of how tick sizes are assigned following a stock split or reverse split.

1397 See SIFMA Letter II at 34. See also 17 CFR 242.600(b)(47) (defining an intermarket sweep order).

1398 See, e.g., Vanguard Letter at 5, Citigroup Letter at 4 , and Virtu Letter II at 17.

et al. (2022)[1399] specifically examine the effect of tick sizes on ISO activity. Their study finds that a narrower tick is associated with more ISO activity which the authors attribute to the increased market complexity associated with implementing trades in a narrower tick environment. This is consistent with the effect considered by the commenters. Consequently, ISO usage is likely to increase for stocks that receive the narrower tick size. One commenter stated that increased use of ISO orders may result in more locked and crossed markets.[1400] Research on the link between ISO usage and locked markets is scant. Increased ISO usage could eventually lead to an increase in locked and crossed markets, which could make transacting on exchanges more complicated, however the magnitude of any effect is uncertain.

Another commenter specifically asked the Commission to consider the effect of a lower tick size on ETFs as opposed to stocks.[1401] The commenter stated that ETFs tend to have larger trade sizes and also that the creation and redemption process for ETFs is unique. However, the commenter does not provide any analysis regarding how these differences would lead an ETF to react differently than a common stock to a reduction in the tick size.[1402] The fundamental economics regarding the tick size tradeoff discussed at the beginning of this section applies to ETFs because the economics discussed in this section rely on the mechanics of quoting and trading, not on the assets underlying the stock or ETF. It is also unclear how the creation redemption process would differ from the analysis provided above. Additionally, the creation/redemption process also does not produce unique economics in the context of these

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1399 See Barardehi et al., supra note 231.

1400 See RBC Letter at 3.

1401 See Tradeweb Letter at 3.

1402 Id.

amendments. This is because authorized participants purchasing the underlying shares to deliver in exchange for shares of the ETF or delivering shares of the ETF in exchange for the underlying assets would still need to purchase and sell the underlying shares in the stock market, subjecting them to the economics of supply and demand for liquidity provision for the stocks in question. Consequently, ETFs with narrower quoted spreads likely will experience an improvement in market quality with a $0.005 tick size. To the extent that ETFs have larger average trade sizes the benefits of the Rule may be smaller, consistent with the analysis presented in Barardehi et al. (2022). But as the adopted amendment is more conservative than the proposed rule in that it applies a tick size of $0.005 to stocks with quoted spreads equal to or less than $0.015, the Commission does not believe, based on the analysis above and commenters evidence presented above, that the amendments are likely to harm ETFs that receive a tick size reduction.

One commenter stated that updated Rule 605 data would "question the validity of assumptions" made in the tick size proposal. [1403] The commenter stated that Rule 605 execution quality data for stocks that have quoted spreads wider than the tick would demonstrate that the minimum quoting increment is not the driver of off-exchange retail trading.[1404] The Commission agrees that there are other factors driving off-exchange retail trading, and adopts changes to Rule 612 for reasons other than a significant change in retail order flow. For this reason, additional information regarding retail execution quality that will arise from amended Rule 605 is not needed prior to adopting amendments to Rule 612.

One commenter stated that variable tick sizes "raise[] concerns about the ability to compare the execution quality for the stock across multiple months," resulting in "a significant

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1403 See Citadel Letter III at 1-2.

1404 Id.

possibility of investor confusion when comparing Rule 605 reports across several months."[1405] The Commission acknowledges that changes in the tick size may result in changes to the levels of some measures of execution quality that are sensitive to the tick size, such as price improvement, over time. To the extent that this reduces the interpretability of Rule 605 reports, particularly for stocks that experience frequent changes in the tick size, this could represent a cost of the amendments. However, there are several factors that will mitigate this potential cost. First, the adopted amendments include an operative period that limits the frequency at which a tick assignment is updated to a minimum of six months. The fact that a stock's tick assignment cannot vary more frequently than every six months greatly reduces the number of potential changes in execution quality levels in monthly Rule 605 reports that result from changes to a stock's tick size. Second, to the extent that market participants will be able to combine Rule 605 information with information about a stock's historical tick size,[1406] this will allow them to control for this characteristic when assessing a stock's execution quality data over time. In addition, as acknowledged by the commenter, a change in the tick size "may impact market centers and broker-dealers reporting under 605 in the same manner,"[1407] such that variations in the tick size (and the resulting mechanical effects on execution quality levels) will not impact the use of Rule 605 to compare execution quality across reporting entities within a given month.

If FINRA chooses not to update Rule 5320 (the 'Manning Rule'), the lower tick size could make claiming the price improvement exception to FINRA Rule 5320 harder for market

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1405 See SIFMA Letter II at 20-21.

1406 While there is no requirement for the listing exchange to disseminate historical information about the tick size, it is likely that this information will be collected and disseminated by other market participants, such as firms providing services related to financial data and analysis because there would likely be demand for such data because, for example, it would be needed to perform after the fact transaction cost analysis.

1407 See SIFMA Letter II.

participants since it would require a two-tick price improvement for some stocks instead of a one tick price improvement. One commenter stated that because the price improvement exception in the Manning Rule is currently tied to $0.01 price improvement, a tick size smaller than $0.01 would "greatly increase the cost and complexity of compliance and would likely disincentivize (or eliminate) the handling of customer limit orders by wholesale broker dealers."[1408] The commenter made this statement specifically referencing the proposed $0.001 tick increment. The adopted amendments do not include the $0.001 tick size and so these concerns are significantly mitigated. Nonetheless, requiring two tick price improvement for some orders could increase the complexity associated with complying with the Manning Rule, particularly in situations where the quoted spread is only one tick wide because it would require more than crossing the quoted spread in order to claim the exception. For broker-dealers, such as wholesalers, whose business models center on internalizing customer orders within the NBBO, the requirement to, in some instances, more than cross the quoted spread in order to execute a customer order could be a disincentive to handling some orders as it could render such trades unprofitable.[1409]

One commenter stated that a lower tick size could lead to oscillation in some stocks between tick sizes.[1410] The commenter stated that a stock that falls just under the threshold and thus receives a smaller tick may be subject to more undercutting with the smaller tick size, which could cause quoted spreads to widen. Wider spreads would make the stock revert to the wider tick size, which would reduce undercutting so that quoted spreads would decline. A narrower

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1408 See Citadel Letter I at 8.

1409 See supra note 193 and surrounding text for further discussion.

1410 See Mitre Corp. Letter at 5.

spread could lead to a smaller tick in the next round and so on.[1411] The Commission believes that this outcome is unlikely given the analysis provided in this section. Stocks receiving the smaller tick size are expected to experience smaller quoted spreads due to the smaller tick size allowing pricing that better reflects supply and demand. This effect would reduce oscillation. Stocks receiving the smaller tick size would likely experience tighter quoted spreads making it less likely that they would revert to the $0.01 tick in the next evaluation period.

2. Lower Access Fee Cap

The amendments will lower the access fee cap from $0.003 per share (30 mils) to $0.001 per share (10 mils) for NMS stocks priced at $1.00 or more, and from 0.3% to 0.1% of the share price for stocks with prices less than $1.00. Lowering the access fee cap preserves price coherence,[1412] given changes to the tick size. Moreover, the Commission expects that lowering the access fee cap will result in lower transaction costs for investors. The Commission also expects that a lower access fee cap will result in wider quoted spreads; however, market quality will nonetheless improve. Lowering the access fee cap will reduce exchange transaction revenue due to lower capture on sub-$1.00 stocks. We describe these effects in more detail below.

Commenters, with few exceptions,[1413] agreed on the need for Commission action on access fees given the change in the tick size.[1414] One commenter stated that in light of the

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1411 Id.

1412 See infra section VII.D.2.a

1413 Exceptions include e.g. Citigroup Letter at 6, and World Federation of Exchanges Letter at 4, Pragma Letter at 7, Hudson River Letter at 4, and Budish Letter at 6-7. However, these commenters did not present arguments suggesting that an access fee greater than 50% of the tick size would not cause price coherence problems. The Commission believes that retaining a 30 mil access fee for stocks trading with a $0.005 tick would further separate the price from the economics of the trade and disrupt the coherence between nominal and net pricing as the access fee cap would be greater than 50% of the tick size.

1414 See, e.g., Nasdaq Letter I at 19 (stating "Nasdaq recognizes that if Commission action successfully updates tick sizes and narrows spreads for certain stocks, then existing exchange access fees and rebates may no

reduction in ticks for some stocks to $0.005, leaving the access fee cap at 30 mils would "distort trading economics in a manner that undermines the Commission's goals for competition and Best Execution."[1415] Many commenters supported a 10 mils access fee.[1416] Some commenters went further, stating that the Commission should explore "comprehensive access fee reform" or ban rebates entirely. [1417] Some commenters suggested what they viewed as a less extensive change, namely an alternative in which some stocks had a fee of 15 mils whereas others had a fee of 30 mils.[1418] In short, while commenters agreed on the need for Commission action to lower the access fee cap, they disagreed regarding the specifics.

a. Coherence Between Net and Quoted Prices

In the Proposing Release, the Commission discussed the need to maintain an access fee cap that is less than half of the tick size due to the need to maintain coherence between net and

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longer be appropriate."), See Cboe, State Street, et al. Letter at 3 (stating "We acknowledge that a reduction in quoting increments for tick constrained symbols could make it advisable for market centers to reduce access fees for the affected symbols to ensure a consistent equity market structure framework."), see Better Markets Letter II at 3-4 (stating "A reduction in the minimum tick size without reducing access fees could permit fees to become a higher percentage of the minimum pricing increment, which would almost certainly undermine price transparency."),and see RBC Letter at 4 (stating "If the MPIs are meaningfully reduced as noted in the Proposal, then access fees would need to be lower as well.").

1415 Nasdaq Letter I at 19.

1416 See, e.g., BlackRock Letter at 10-11, BMO Letter at 3-4, Budish Letter, IEX Letters I-V, JPMorgan Letter at 6, NASAA Letter at 9, Vanguard Letter at 2 and 6, XTX Letter at 5.

1417 See We The Investors Letter I at 3-4 (recommending banning rebates); Harris Letter at 4 (recommending reverting to traditional fees, thereby effectively eliminating rebates). BlackRock Letter at 11 states "Although we believe that the current proposal may miss an opportunity to enact more holistic and lasting access fee reform, we concede that, for highly liquid securities, a 10 mil access fee cap reasonably threads the needle between countervailing adverse consequences. Accordingly, under a uniform fee model, we would be supportive of setting the access fee cap at 10 mils."

1418 See infra note 1805 for a list of commenters suggesting this alternative, and a discussion of the costs and benefit of this alternative.

quoted prices.[1419] Commenters, with few exceptions,[1420] agreed.[1421] Reducing the access fee cap to 10 mils will satisfy this condition of coherence. As explained in the Proposing Release, only the best posted price is protected. Under the current regulatory framework, leaving the access fee cap at 30 mils could preclude market participants from trading on exchanges that have the best displayed price when fees and rebates are included. Suppose a traditional exchange has a displayed protected bid at $10.010, whereas an inverted exchange has a displayed protected bid at $10.005. Order protection would require the exchange to have policies and procedures in place reasonably designed to prevent trades from occurring at a price worse than the protected quote,[1422] effectively requiring the investor to go to the traditional exchange if the investor wished to trade against a displayed, on exchange bid. However, on the traditional exchange, the investor demanding liquidity would take home $10.007, whereas on the inverted exchange, the investor would take home $10.008.[1423]

Closely related to the lack of price coherence on exchanges is the effect on price transparency. To illustrate, consider a situation with an access fee and rebate of $0.003 and a tick

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1419 See Proposing Release, supra note 11, at 80348 n.712. Net and quoted price rankings are coherent if sorting trading venues on the competitiveness of their quoted prices yields the same ordering as sorting on prices net of fees and rebates.

1420 Exceptions are Citigroup Letter at 6, and World Federation of Exchanges Letter at 4. These commenters do not present arguments that counter those others in the comment file. The Commission believes that retaining a 30 mil access fee for stocks trading with a $0.005 tick would further separate the price from the economics of the trade and disrupt the coherence between nominal and net pricing as the access fee cap would be greater than 50% of the tick size.

1421 See, e.g., MEMX Letter at 22-24 and Pragma Letter at 7.

1422 See 17 CFR 242.611(a)(1); see also 17 CFR 242.611(b) (exceptions).

1423 For the liquidity demander in this example, the net proceeds of selling to the liquidity provider on the traditional exchange would be the quoted price of $10.01 less the $0.003 access fee, or $10.007. On the inverted venue the liquidity demander would receive the quoted price of $10.005 plus a taker rebate of $0.003 from selling, or $10.008. Although the liquidity demander would receive a better net price by selling at the inverted venue, because the traditional exchange has the better quoted price the order protection rule will prevent the trader from accessing the liquidity on the inverted venue before first accessing the liquidity on the traditional exchange.

size of $0.005. Consider the effect on prices of a stock. Suppose one sees a trade executed at a price of $10.005 followed by another executed at a price of $10.010. Many investors would interpret this as a sign that a stock was increasing in value. However, with an access fee of $0.003, the net price of the first order if it represents a market order to buy is $10.008 (the buyer pays $10.005 + $0.003), whereas the net price of the second order if it is a market order to sell, is $10.007 (the seller receives $10.010 and pays $0.003 in fees). The price has fallen, not risen, an effect that only the most sophisticated market participants would be able to discern. [1424] Lowering the access fee cap to 10 mils would solve both of these problems.

b. Quantitative Net Capture Analysis

While the amendments do not directly dictate what rebates trading venues can offer, trading venues generally finance rebates through access fees, so in practice reducing the access fee cap will lower the rebates offered.[1425] If trading venues were to subsidize rebates by taking a net loss per share transacted, they would be vulnerable to experiencing extreme and unpredictable losses if volumes spike. Such a trading venue could experience such losses if its non-transaction fee sources of revenue do not increase enough with a spike in trading volume to offset their negative net capture. Trading volumes can vary significantly through time, with little ability for a trading venue to predict the timing and magnitude of changes in trading volume. For example, in January 2021 volume spiked dramatically for certain stocks relative to pre-January 2021 levels.[1426] Exchanges could face financial hardship should rebates deviate substantially

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1424 See Budish Letter at 6.

1425 See supra note 1077 and surrounding text discussing that access fees fund transaction rebates and while trading centers could subsidize rebates with non-fee revenues they do not do so in practice.

1426 See Staff Report on Equity and Options Market Structure Conditions in Early 2021 (Oct. 14, 2021) available at https://www.sec.gov/files/staff-report-equity-options-market-struction-conditions-early-2021.pdf.

from fees; so it is unlikely that exchanges would take this risk. For this reason, rebates and the cap on access fees are tied together.

As explained in section VII.C.2.b, the Commission understands that the net capture for non-auction trading in stocks that have a price equal to or greater than $1.00 is likely close to 2 mils for most exchanges. An exchange net capture rate of approximately 2 mils is in line with current pricing practices at most exchanges; it is reasonable to estimate that exchanges would realize a similar net capture rate because the current net capture rate will remain possible under the adopted amendments. The Commission acknowledges uncertainty over whether this 2 mils capture rate will persist or be different should trading venues choose to alter their business model in response to the change in access fees. The analysis that follows assumes that exchanges will maintain the practice of financing rebates through access fees, and thus for transactions in stocks priced $1.00 or more the Commission expects the average access fee to be near the 10 mil access fee cap and the average rebate to be approximately 2 mils lower.[1427] The analysis also assumes that the behavior of inverted exchanges and off-exchange venues changes proportionally. Although the amendments would not require proportional change on the part of inverted venues, there is currently no restriction on the level of rebates for taking liquidity or fees for posting; yet, as shown in Table 4 in section VII.C.2, inverted venues generally have fee and rebate levels similar to maker-taker venues and approximately a 2 mils capture rate.

Table 13 uses volume estimates from Table 5 to provide estimates of the fees and rebates that would have been collected and disbursed in 2023 if the amended access fee cap was

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[1427] See section VII.C.2 for additional discussion about the roughly 2 mil estimated net capture rate for exchanges. At certain pricing tiers rebates may exceed the access fee cap. However, because total overall fees exceed the total rebates paid out, the average rebate would remain lower than the average access fee.

implemented.[1428] Panel A shows that under the current system with a 30 mil access fee cap for quotations priced $1.00 or more and a 0.3% access fee cap for transactions less than $1.00, the exchanges collected an estimated $3.4 billion in access fees and distributed $3.1 billion in rebates in 2023, providing an estimated net capture of $337 million for the exchanges in that time period.[1429] In Table 13 the Commission estimates that the exchanges would have collected $1,188 million in access fees and distributed $906 million in rebates in 2023 under the amendment to Rule 610, providing the exchanges a net capture of $282 million in that time period. Thus, the Commission estimates that total access fees collected would have declined by $2.23 billion and rebates distributed by $2.17 billion in 2023.[1430] This amounts to an estimated decline in net capture of $54.9 million across all exchanges. This decline is conditional upon exchanges maintaining a 2 mil capture rate for stocks trading at a price of $1.00 or higher. Any estimated changes in total net capture across exchanges is due exclusively to the change in the access fee cap for stocks trading below $1.00.

Panel B provides estimates of the effect of the amendments on access fees paid and rebates received by liquidity demanders and providers separately. The Commission estimates that, under the amendments, liquidity demanders would have paid $1.93 billion less[1431] in access

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1428 This assumes that exchanges continue the practice of funding rebates through access fees, that trading volumes are unchanged relative to 2023, that the distribution of trading volume across exchanges is unchanged, and that the distribution of trading volume priced below $1.00 and at or above $1.00 remains unchanged.

1429 See Table 6 for additional analysis on current estimates of exchange net capture.

1430 Balancing out expected rebates paid on make-take, inverted, and flat fee venues, the Commission estimates that liquidity demanders will pay $1.93 billion per year less in access fees netted across all venues under the Rule and liquidity providers will receive $1.88 billion per year less in rebates netted across all venues.

1431 The ultimate effect of this change will not result in liquidity demanders saving the full $1.93 billion in transaction costs, because the effect of reduced rebates will cause the quoted spread to widen, offsetting this reduction in the access fee. See supra section VII.B.3, infra section VII.D.2.c for a discussion of these points.

fees and liquidity providers would have received $1.88 billion less in rebates in 2023. Thus, the current estimated $2.6 billion in fee funded rebates in 2023 would have decreased by approximately 70% under the amendments.

Table 13: Estimated Access Fees and Rebates Collected - Current and Adopted 2023[a]

Panel A: Estimated Access Fees Collected and Rebates (in Millions of Dollars)

	Current	Rule	Difference
Fees Collected	3,414.00	1,188.91	-2,225.21
Rebates Distributed	-3,076.50	-906.16	2,170.30
Exchange Capture	337.66	282.75	-54.90

Panel B: Estimated Fees by Liquidity Type (in Millions of Dollars)

	Current	Rule	Difference
Liquidity Demander	2,969.12	1,034.61	-1,934.51
Liquidity Provider	-2,631.47	-751.86	1,879.61
Exchange Capture	337.66	282.75	-54.90

[a] This table takes trading volumes presented in Table 5 to calculate aggregate fee and rebate estimates under the Rule. Current estimates of fees collected and rebates distributed are taken from Table 6. The analysis presumes that exchanges with fees and rebates currently above 10 mils will decrease fees and rebates to a 10 mil fee and 8 mil rebate (the exceptions being IEX which charges 10 mils to takers and rebates 4 mils to makers, NYSE Chicago which charges both sides 10 mils, and LTSE which does not charge fees). For trading in securities priced less than $1.00, estimates of fees and rebates presume that all sub $1.00 fees from Panel B of Table 4 which are over 0.10% are reduced to 0.10%, fees at or below 0.10% remain the same. Computations are made per exchange and then aggregated as shown above.

Table 14 presents analysis showing an estimated total reduction of approximately $55 million per year in net capture due to the reduction in the access fee cap and how it might in turn affect the transaction revenues of each of the various exchange families. This estimated decline in transaction revenue comes exclusively from the reduction in the access fee cap for transactions in securities below $1.00.[1432] This is because, as previously explained, the Commission expects

[1432] This $54 million estimate is lower than the estimated $89 million per loss year provided in the Proposing Release. The difference comes because the adopted access fee cap for transactions priced below $1.00 is

that for transactions priced equal to or greater than $1.00 the exchanges should be able to maintain their current net capture.[1433] For transactions priced below $1.00 most exchanges currently charge the maximum 0.3% but typically offer no rebates.[1434] Because very few exchanges offer rebates on stocks priced below $1.00, the access fee represents the exchange's net capture. Lowering the access fee from 0.3% to 0.1% on these transactions will represent a decrease in net capture of 66% for many exchanges. This decrease may vary across exchanges. Some exchanges do not charge any fees for trading in sub $1.00 securities, while others charge a fee to both sides of a sub $1.00 transactions. Additionally, the exchanges differ in the fraction of sub $1.00 trading volume that they handle.[1435] Table 14 provides an annual estimate of the effect on exchange transaction revenue of lowering the access fee on exchanges' net capture given realized volumes in 2023 for each exchange group. To the extent that the reduction in the access fee causes more trading at sub-dollar prices, Table 14 overestimates the reduction in exchange transaction revenue.[1436]

Table 14: Estimated Effect of Rule on 2023 Exchange Transaction Revenue for Stocks Prices Below $1.00[a]

higher than the proposal: 0.10% compared to 0.05% proposed. This reduces the loss on transactions priced below $1.00. Additionally, as can be seen by comparing Panel B of Table 5 in the Proposing Release and Table 4 herein, multiple exchanges have lowered access fees for transactions below $1.00 since the proposal making the Rule's difference from the baseline smaller.

1433 As discussed in section VII.C.2, the Commission estimates that most exchanges have a net capture of approximately 2 mils on transactions priced greater than $1.00. For reasons discussed in this section the Commission believes that it is reasonable to assume that exchanges with a current 2 mil net capture would be able to continue to earn a 2 mil net capture.

1434 See supra Table 4. Most exchanges do not offer rebates for stocks priced less than $1.00, or if they do the rebates are quite small.

1435 See supra Table 5.

1436 The benchmark model in section VII.B.3 implies that a reduction in the access fee will cause the liquidity demand curve to shift, resulting in a higher volume of trades at sub-dollar prices. See also infra note 1462 and surrounding text for a case study on the effect of a rebate instituted by MEMX for sub-dollar trades, which resulted in a higher level of sub-dollar trades; if a reduction in the access fee has a similar effect on equilibrium trading as the institution of the rebate, then the volume of sub-dollar trades will increase and the reduction in exchange revenue will be mitigated.

	Transaction Revenues ($)	Transaction Revenues (%)
Nasdaq	-$18,593,052	-20%
NYSE	-$18,750,074	-19%
Cboe	-$12,375,769	-16%
MEMX	-$4,517,207	-21%
IEX	$0	0%
MIAX	-$667,838	-7%
LTSE	$0	0%
Total	-$54,903,941	-16%

[a] The variable Transaction Revenue ($) provides an annualized estimate of the effect of the amendment to Rule 612 on exchange net capture. For all exchanges, other than LTSE which doesn't charge an access fee and IEX which has an assumed net capture of 6 mils per share traded above $1.00 (Panel A of Table 4 shows that IEX charges a fee of 10 mils coupled with a rebate of 4 mils), the net capture on transaction priced equal to, or greater than, $1.00 per share is expected to remain unaffected by the amendments at the assumed 2 mils per share. The 2 mils per share assumption is further discussed in section VII.C.2.c.Thus, the Commission does not expect any decrease in overall exchange transaction revenue per share for shares priced above $1.00. For transaction volume below $1.00 per share estimates for the decline in transaction revenue is computed by assuming that under the amendments all exchanges currently charging more than 0.10% for transactions will lower the transaction fee to 0.10%. Exchanges currently charging access fees less than or equal to 0.10% will continue to charge their current rates. The list of current estimated exchange sub $1.00 pricing comes from Panel B of Table 4. Sub $1.00 dollar volume estimates for each exchange are from Table 5. The estimated transaction revenue under the amendments is compared to the estimated transaction revenue in the current environment that is estimated using the sub $1.00 transaction fees/rebates for each exchange presented in Table 4 Panel B and multiplying these fees by volume estimates for each exchange from Table 5. See section VIII.C.2 for Tables 4 and 5. The difference is presented in the Table 14 along with the precent change in transaction revenue from the baseline.

Lastly, transaction fees in stocks priced less than $1.00 serve to increase the net cost of accessing liquidity as they do not tend to fund rebates to liquidity providers so there is no incentive that could induce spreads to narrow and on average offset the fee.[1437] Lower transaction costs for these securities may improve liquidity for stocks with prices less than $1.00.

[1437] See supra section VII.B.3 for additional discussion of how fee-funded rebates are largely off-set by changes in the quoted spread to keep net-costs the same.

However, given the relatively low natural trading interest, the Commission does not expect a significant improvement in the trading environment for these securities.

Given the low net capture rates, the Commission concludes that in most cases, access fees are typically used to fund rebates and not used exclusively to fund execution services. Multiple commenters stated that current access fees and fee caps are not reflective of the current actual costs of providing execution services.[1438] One commenter stated that the cost of processing and matching trades has dropped with technological advances.[1439] Another commenter stated that "the fees charged by exchanges are often far in excess of those necessary to maintain operations of the exchange."[1440] A commenter pointed to significant reductions in spread and commissions since 2005, which have resulted in the 30 mil access fee cap representing a more significant economic factor in trading.[1441]

One commenter stated that a 10 mil access fee cap would represent a "fair pricing model based on the 'cost plus reasonable return' methodology" by citing that ATSs charge 10 mil fees while employing similar technologies as exchanges.[1442] On this latter point, a commenter stated

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1438 See, e.g., Vanguard Letter at 6, Verret Letter I at 7, and Retirement Coalition Letter at 1.

1439 See Better Markets Letter I at 15.

1440 See Healthy Markets Letter I at 22.

1441 Citing its own previous comment letters one commenter has stated since at least 2014 that a reduction in the access fee cap is warranted given the reduction in trade commissions and narrowing of spreads relative to when the 30 mil access fee cap was first established. See Citigroup Letter at 5.

1442 See Verret Letter I at 5-7. One commenter provided their own review of form ATS-N and specifically looked at minimum and maximum ATS fees; the commenter reported that the maximum ATS fee often exceeds 10 mils by a considerable margin, see Nasdaq Letter III at 3. The Commission does not dispute that maximum ATS fees can exceed 10 mils, but the maximum ATS fee is not an appropriate benchmark for exchange access fees because the maximum ATS fee can be a function of particular services (e.g. block trades or special order types) or of subscriber characteristics (e.g. subscriber order flow might be segmented into specific categories), while an exchange's access fee schedule applies to all members. Another commenter presented analysis on the subset of ATSs that primarily operate a "continuous book" market and are therefore most closely comparable to exchanges. The commenter's analysis indicates that seven such ATSs—representing 42% of all ATS volume—charge a maximum of 10 mils. The commenter concluded that the standard rate in the competitive ATS market is 10 mils, while rates substantially above

that a uniform access fee cap of 10 mils would, "have the added benefit of aligning exchange fees with prevailing ATS fees, and creating a more equitable competitive landscape across trading venues."[1443]

In contrast, one commenter stated that the Commission had not established that the "proposed reduced fee caps do, in fact, bear a reasonable relationship to the actual costs to an exchange of a trade."[1444] The same commenter stated that technological costs are not significant determinants of access fee levels, but rather that the fees reflect the magnitude of risk associated with providing liquidity as well as the value to the market that having access to those quotes provides.[1445] The commenter further stated that the current access fee cap is not "unreasonably high," because, among other things, "exchange platform costs to market participants have remained competitive over time."[1446] As the quantitative net capture analysis shows, the access fee cap in the adopted amendments will still permit typical exchange net captures. Thus, for stocks priced greater than $1.00, lowering the access fee cap is not expected to affect the contribution to revenue and thus to the platform. The following section discusses the effects of a reduction of fees and therefore rebates on the provision of liquidity.

c. Effects on Liquidity and Transaction Costs

The main implications for liquidity from reducing the access fee caps follow the basic principles laid out in sections VII.B.3, as well as the empirical results in section VII.C.2. Most

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10 mils are due to specialized services not available on exchanges, see IEX Letter VI at 5; the Commission agrees.

1443 See BlackRock Letter at 11.

1444 Nasdaq Letter I at 22.

1445 See Nasdaq Letter I at 21; Nasdaq Letter II at 4.

1446 Nasdaq Letter II at 2 and 5.

exchanges charge close to the preexisting access fee cap due, in part, to the disincentive to unilaterally reduce fees and rebates. For the same reasons that exchanges charge close to the preexisting access fee cap, the Commission believes that lowering the access fee cap will lead exchanges to charge similarly close to the new cap. Some exchanges that are currently charging less than the amended access fee cap may continue to do so. Exchanges will most likely not alter their net capture rates, implying that much of the access fee will continue to fund rebates in stocks priced above $1.00. For reasons discussed further below, the reduction in the access fee cap is likely to leave the cost of accessing liquidity unaffected for some stocks, and to reduce the cost of accessing liquidity for others.

For stocks priced less than $1.00, the reduction in the access fee cap is also likely to reduce the cost of accessing liquidity. Unlike for stocks priced $1.00 or more, for stocks priced less than $1.00 most exchanges charge an access fee without providing a rebate.[1447] Since there is no rebate, which would serve to narrow spreads and offset the cost of the access fee, the access fee only serves to increase the cost of taking liquidity in these stocks. Therefore, a reduction in the access fee from 0.3% to 0.1% for stocks priced less than $1.00 will lower the cost to take liquidity. Some exchanges offer rebates in transactions in stocks priced less than $1.00.[1448] In these instances, under the assumption that these exchanges will uniformly reduce their fees and rebates to maintain the same net capture rate, the reduction in the access fee cap is not expected to affect the cost of taking liquidity.

1447 See supra Table 4.

1448 For example, the Cboe EDGX and MEMX exchanges offer rebates for sub-$1.00 stocks. See supra Table 4 and surrounding discussion noting that only a few exchanges offer rebates in transactions for stocks priced $1.00 or less.

Additionally, reducing the access fee cap for stocks priced less than $1.00 from 0.3% to 0.1% of the quote price will also ensure that the cost of accessing liquidity is similar for stocks with one quote below $1.00 and another quote equal to or greater than $1.00. Consider a stock with a best bid quote at $0.99 and a best ask quote at $1.00. Under the amendments, the maximum fee to access the bid quote is 9.9 mils and is roughly equal to the 10 mils maximum fee to access the ask quote. Had the Commission lowered the access fee cap for stocks priced $1.00 or more but left it unchanged at 0.3% for quotes priced less than $1.00, the cost of accessing the sub-$1.00 quote would be relatively more expensive than the cost of accessing the $1.00 or more quote. Here, had the fee cap for quotes priced at or higher than $1.00 been reduced to 10 mils but the fee cap for sub-$1.00 trades remained at 0.3%, the maximum allowable fee to access the $0.99 quote would be 29.7 mils, roughly 3 times greater than that of accessing the ask price. Having a large differential between access fees on opposite sides of an order book would inhibit the ability of markets to reach prices most reflective of the underlying value.[1449]

Commenters on the proposed access fee cap reduction focused on access fees for stocks priced above $1.00.[1450] Several commenters argued for an alternative in which stocks with a half-penny tick would have an access fee of 15 mils, whereas stocks with a penny tick would have an access fee of 30 mils (hereafter "15 mils/30 mils alternative").[1451] As discussed in

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1449 Reducing the access fee cap for trades priced at $1.00 per share or greater to 10 mils without a similar reduction in the fee cap for those priced below $1.00 could distort markets by introducing an incentive for market participants to exploit differences in fees and rebates for stocks near the $1.00 threshold. If the maker rebates available under the 0.3% fee cap for sub $1.00 stocks are greater than those for quotes priced at or greater than $1.00 then market participants, then market makers may be incentivized to push prices below $1.00 as they could capture higher rebates by posting at bid and ask at $0.98 and $0.99 respectively as opposed to quoting at $1.00 and $1.01.

1450 An exception is Cboe Letter IV and Letter II, discussed further at the end of this subsection.

1451 See, e.g., NYSE, Schwab, and Citadel Letter at 2, Nasdaq Letter I at 2, MMI Letter at 7, Robinhood Letter at 5, and MEMX Letter at 23-24. See also Nasdaq Letter IV and NYSE Letter I.

sections VII.B.3 and VII.C.2, there is a strong economic tie between the level of the access fee cap and the ability to pay rebates. The discussion among commenters focused on the effect on rebates, with some commenters who favored of the 15 mils/30 mils alternative naming the ability to pay rebates as the primary reason for the higher access fee cap;[1452] other commenters specifically were in favor of a ban on rebates. [1453] One of these commenters stated that banning rebates (by requiring exchanges to revert to a pricing model where both sides of a transaction were charged a fee) would fix the problems associated with access fees and rebates, but stated that a second best solution would be to impose a uniform access fee on all exchanges.[1454]

Commenters in favor of the 15 mils/30 mils alternative expressed the concern that a 10 mils access fee cap would reduce the flexibility to offer rebates. The commenters assert that rebates are necessary to compensate liquidity providers to post displayed (or "lit") quotes on exchanges.[1455] According to the commenters' logic, a lower access fee cap translates into a lower rebate, which translates into fewer lit quotes. These commenters also state that those quotes that are posted are likely to be wider.[1456] Wider and fewer posted quotes, according to these commenters, signify lower market quality.

1452 See, e.g., Nasdaq Letter I at 2.

1453 See We The Investors Letter I at 3-4 (recommending banning rebates); see also Harris Letter at 4 (recommending reverting to traditional fees, thereby effectively eliminating rebates).

1454 See Harris Letter at 4.

1455 See, e.g., Nasdaq Letter I at 21, Nasdaq Letter II at 5-7, Interactive Brokers Group Letter at 5, Virtu Letter II at 10, Citadel Letter I at 24, WFE Letter at 4, CCMR Letter at 27, and State Street Letter at 4.

1456 See id. Some commenters specifically identified the NBBO as a matter of concern (Nasdaq Letter IV at 7; Goldman Letter at 8; Nasdaq letter I at 22, Virtu Letter II at 10.). The NBBO reflects lit quotes at a specific size and thus the arguments regarding the NBBO (with an exception described in more detail below) are the same as those for lit liquidity more generally.

The Commission agrees that lowering the access fee cap is also likely to lower rebates because trading venues use access fees to fund rebates.[1457] The Commission also agrees that quoted spreads (spreads that do not reflect rebates or access fees) on lit exchanges are likely to be wider because liquidity providers would be expected to widen spreads to compensate for the lower rebates[1458]—though the fact that the tick size amendments will lower spreads means that the two amendments combined may in fact lead to lower quoted spreads on some stocks.

The Commission, however, disagrees with the commenters' statements that lower rebates from lower access fees will lower market quality and increase transaction costs. The Commission draws on the economic principles articulated in section VII.B.3.[1459] Figure 1 shows how the quoted spreads respond to an equal increase of an access fee and rebate of 30 mils assuming a stock is not tick-constrained. The change contemplated here is a shift of 20 mils because that is the difference between the baseline fee cap of 30 mils and the amended fee cap of 10 mils. When the fees and rebates change together, supply and demand intersect at the same quantity point (thus liquidity offered would be unchanged) but at a different price point, leading to a wider quoted spread. The net spread (the net cost of trading), which takes into account the fees and rebates, would be unchanged.[1460] Thus, the Commission disagrees with commenters who argue

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1457 See supra section VII.C.2 discussing why trading venues fund rebates with access fees and why rebates are not funded by other revenue sources.

1458 See section VII.B.3 discussing how spreads are expected to widen in response to a reduction in fee-funded maker rebates so to keep the net cost of liquidity constant.

1459 The discussion in that section regarding neutrality of fees and rebates does not depend on the access fee charged per share being equal to the rebate, but rather on fees and rebates being reduced or increased by the same amount. As the Commission does not expect the net capture rate to change, the neutrality result applies.

1460 As explained in section VII.B.3, any change in access fees or rebates may be passed from brokers to customers either directly or indirectly, such as through changes in commissions or changes in the broker's services.

on the basis of quoted spread that the 10 mils access fee will lead to increased trading costs and lower liquidity.

Crucially, the reasoning above applies only to a stock with an economic spread of greater than the tick.[1461] When the economic spread is less than a tick, rebates funded by fees result in a pricing distortion, as section VII.B.3.b explains. The price at which liquidity providers would be willing to offer liquidity is less than one tick in the presence of the rebate. However, the tick forms a binding price floor, leading to an oversupply of liquidity. Specifically, the set price of liquidity results in economic rents that accrue to some at the expense of others, in this case to those able to get to the front of the queue the fastest. For these stocks, lowering the access fee will better equate supply and demand and lower transaction costs for investors broadly.

One commenter discussed the introduction of a rebate for sub-dollar trades on MEMX and MIAX. [1462] The rebate, when introduced, was initially set to 0.3% of the dollar value of the trade,[1463] and was reduced to 0.05% several days later. The commenter presents empirical results indicating that the effective spread fell from approximately 0.4% to 0.25% of dollar value after the introduction of the rebate, [1464] and almost completely reversed back to 0.4% days later when

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1461 See section VII.B.1 for the definition of the economic spread.

1462 See Nasdaq Letter II at 5-6 (stating "spreads would widen if access fees were to become inadequate to fund rebates to market makers and other participants that provide displayed liquidity to the markets. This widening would likely be significant, as the data below suggests. It shows that in early December 2020, when MIAX and MEMX first introduced rebates for sub-dollar stocks, spreads for such stocks fell dramatically, but when MIAX and MEMX then slashed rebates soon thereafter, spreads reverted to their prior levels.").

1463 That is, the rebate for sub-dollar trades was initially set equal to the access fee cap for sub-dollar trades.

1464 See Nasdaq Letter II at 6. The effective spread is calculated as the signed difference between the execution price of a trade and the prevailing midpoint (i.e., the execution price minus the midpoint for buy orders and the midpoint minus the execution price for sell orders); the commenter then divides this by the midpoint price to arrive at the effective spread as a percentage of the price (mirroring the fact that the rebate is paid as a percentage of the execution price). The effective spread differs from the quoted half-spread because a trade may receive price improvement—that is, the trade may execute at a better price than the best quote, so that the effective spread is lower than the quoted half-spread—or a large trade may execute against

the rebate was reduced to 0.05%.[1465] In short, a rebate of 0.3% of dollar value led to a reduction in effective spreads of 0.15% of dollar value. The commenter's empirical result is consistent with the model presented in Figure 1. The model presented in Figure 1 predicts that a rebate will cause the liquidity supply curve to shift by the amount of the rebate—liquidity suppliers are willing to offer liquidity at a lower price on account of the rebate. In contrast to Panel B of Figure 1, however, the commenter's example does not include an increase in the access fee to fund the rebate; therefore, the commenter's example can be modelled by recreating Panel B without the shift in the demand curve—i.e., the introduction of the rebate will cause the equilibrium outcome to shift from the point where the dotted lines intersect to the point where the solid supply curve intersects with the dotted demand curve. The model therefore has multiple empirical predictions for the commenter's example: when the rebate is introduced, without a similar increase in access fees, the model predicts that spreads will fall and the equilibrium amount of liquidity transacted will rise; when the rebate is rolled back, the model predicts that

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multiple levels of the order book. Both the effective spread and the quoted spread are measures of liquidity, but the quoted half-spread measures the prospective cost of trading immediately at the best available prices while the effective spread measures the ex-post cost of trading immediately (accounting for hidden orders and other sources of price improvement not known ex-ante, as well as order size). Additionally, because the effective spread measures the ex-post cost of trading immediately, it can only be calculated in the presence of a trade. Therefore, the effective spread is typically calculated by taking a weighted average of the effective spread across transactions—the commenter, for example, weighted the effective spread by the notional amount of each transaction. The quoted spread can be averaged over time—as with the TWAQS—because it is an ex-ante measure.

[1465] The commenter's results can be exhibited with a numerical example. Suppose in the absence of rebates a stock trades with a best offer of $0.52 and a best bid of $0.48, yielding a midpoint of $0.50. A liquidity supplier at the offer would therefore receive proceeds of $0.52 when their offer is executed against. The effective spread in the commenter's example would be calculated as the distance between the execution price and the midpoint, divided by the midpoint: ($0.52 - $0.50)/$0.50 = 4%. Now suppose that a rebate of 0.3% is offered by the exchange. In the commenter's analysis, this reduces the effective spread by 0.15% to 3.85% (from 4%). This implies that the offer price would shrink from $0.52 to approximately $0.51925 (keeping the midpoint constant at $0.50 and using the fact that the effective spread must equal the difference in the ask and the midpoint, divided by the midpoint so that 3.85% = ($0.51925-$0.50)/$0.50). The liquidity provider would therefore earn $0.51925 plus the rebate of 0.30% for a total proceed of $0.5208 ($0.51925+ 0.003*$0.51925).

spreads will rise and the equilibrium amount of liquidity transacted will fall. The model's predictions on spreads are borne out by the commenter's data—spreads fell 0.15% when the rebate of 0.3% was in place, and spreads reverted when the rebate was rolled back.[1466] The model's prediction on the quantity of liquidity transacted are also borne out by Commission analysis—when the 0.3% rebate was in place, the dollar-volume of sub-dollar trades increased by a factor of three.[1467] In sum, the introduction of a rebate for sub-dollar trades on MEMX and MIAX resulted in a market reaction that is directionally consistent with the Commission's economic model presented in section VII.B.3.a and Figure 1. The large and abrupt tripling of trading volume is also consistent with concerns that rebates cause excessive intermediation.[1468]

Some comments address the question of incentives for trading on exchanges. These commenters state that, as a result of the Commission's adoption of 10 mils versus 15 mils/30 mils alternative, the volume on lit exchanges will decline.[1469] Other commenters disagreed, stating that lower access fees could lead volume on exchanges to increase.[1470] However, the

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1466 The fact that spreads fell by less than the amount of the rebate indicates that rebates do not generally lower trading costs beyond the cost of funding the rebate; this is contrary to one commenter's statement that, "any cost savings non-retail investor participants realize from a reduction in the access fee cap are likely to be more than consumed by the rising frictional costs…associated with wider spreads." See Cboe Letter IV at 5, and further discussion surrounding infra note 1492.

1467 In the week of Nov. 23, 2020, there was daily trade volume at sub-dollar execution prices of approximately $330 million; the figure was $383 million in the week of Dec. 7. The intervening week—the week of MEMX's 0.3% rebate for sub-dollar executions—saw $1,025 million in daily trade volume at sub-dollar prices. The calculations are constructed using all normal trades that execute during normal trading hours from TAQ. Following the methodology in Nasdaq Letter II at 6, the calculations for the week of Nov. 30 exclude Nov. 30 and Dec. 4.

1468 See supra note 1005, and see also the Proposing Release, supra note 11, at 80292.

1469 See, e.g., Cboe Letter II at 8-9, Cboe Letter IV at 3-5, Nasdaq Letter I at 22-23, Nasdaq Letter II at 4, Nasdaq Letter IV at 9, and Nasdaq Letter V at 2, predicting that a reduction in rebates will increase segmentation and may make ATSs and single-dealer platforms more attractive. See also infra note 1761 and surrounding text.

1470 See Better Markets Letter I at 15 stating that "A reduction in access fees will impose lower costs on investors, removing a disincentive for trading on exchanges." Healthy Markets Letter I at 22, stating "Brokers' avoidance of these [access] fees is a significant contributor for brokers often choosing to

above analysis indicates that liquidity providers would not be deterred from quoting on exchange because they could widen the quote, thereby receiving the same economic profit as they received with the rebate. Liquidity demanders would not be worse off because the reduction in access fee would offset, or, in the case of stocks with an economic spread of less than a tick, more than offset, the increase in spread.

Commenters specifically stated that posted quotes on exchange face the risk of adverse selection. They state that a premium is necessary to compete with the off-exchange market, and that the rebate provides that premium. As other commenters state, this does not take into account the access fee, which (all else equal) discourages liquidity takers from accessing exchanges. Moreover, a premium can come in the form of the spread as opposed to a rebate. While the order protection rule requires that trading centers enforce policies and procedures that are reasonably designed to prevent trades from being executed at a price worse than the protected quote, nothing prevents off-exchange non-displayed liquidity being at a better price for the liquidity taker and worse price for the maker, and indeed that happens under the current fee/rebate structure. Rather than moving liquidity off-exchange, liquidity providers could widen the difference between on- and off-exchange quotes, leaving the underlying economic tradeoff the same.

The above analysis shows that the same opportunities that are available on-exchange in today's environment are still expected to be available with the adoption of these amendments, even under the lower access fee cap (indeed, these opportunities are expected to improve due to

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internalize or first route to ATSs or OTC market makers, rather than to exchanges", IEX Letter I at 26 (stating "A substantial reduction in the access fees will be impactful for those investors and is likely to increase their willingness to trade on exchanges....The result can be an increase in the use of displayed exchange trading and an improvement in the price discovery function of the market, with broad benefits extending beyond trading on exchanges themselves"), See also IEX Letter IV at 18-19, BMO Letter at 3, and Themis Letter at 7-8.

the amendments to Rule 612). However, commenters state that the off-exchange environment may change due to the amendments.[1471] These commenters raise concern regarding the amount of liquidity that is displayed versus non-displayed. One commenter stated that wider quoted spreads on exchange increase the range of prices at which trades execute off-exchange.[1472] Because Rule 611 generally requires that off-exchange trades execute within the NBBO, as on-exchange spreads widen, a liquidity provider, now facing a wider NBBO, would be able to offer a wider spread off-exchange than that liquidity provider could do now. The commenter appears concerned that this ability to offer a wider spread off-exchange than previously will attract liquidity to off-exchange, and more specifically, non-displayed venues.

However, while liquidity providers would have the ability to offer wider spreads off-exchange than prior to the amendments, they would not necessarily have the incentive to do so. For while wider spreads would mean greater profits for the liquidity provider, that is only the case if their orders are filled. As stated by a commenter, off-exchange liquidity would still need to compete with on-exchange liquidity, and that on-exchange liquidity is now less expensive to access due to a lower access fee cap.[1473] If the spread off-exchange were to widen, non-displayed off-exchange quotes would be unlikely to attract liquidity takers. Therefore, there is not an incentive for liquidity providers to migrate off-exchange due to wider spreads on exchange. To summarize, spreads may widen on-exchange increasing pricing flexibility off-exchange, even so

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1471 See supra note 1479 and surrounding discussion.

1472 See Cboe Letter III at 5: "Wider spreads are likely to most benefit wholesale broker-dealers, that may be able to offer more levels of price improvement, but at the expense of increased frictional costs for investors."

1473 See IEX Letter IV at 23: "The fact that exchanges use rebates to draw orders from other exchanges says nothing about the ability of exchanges to attract more orders that now go to off-exchange venues by using lower access fees and offering better execution quality."

exchanges are not expected to lose volume due to the reduction in the access fee cap through this mechanism.

One commenter stated that volatility may increase due to the wider quoted spread when the access fee reduction causes a reduction in rebates.[1474] The Commission acknowledges that wider spreads definitionally imply a greater difference between the bid and the ask. However, spreads that better reflect the true underlying cost of liquidity are more efficient than spreads that mask this cost.

One commenter stated that a reduction in rebates will lead to more off-exchange trading, which in turn will cause the NBBO to widen, and result in worse execution for off-exchange trading, because of the way some off-exchange trading uses the NBBO as "a reference price for benchmark pricing and other risk functions."[1475] First, the Commission describes above why the adopted amendments will not result in a large amount of trading moving off-exchange. Furthermore, while the Commission does expect the quoted spread, and therefore the NBBO, to widen, we disagree that this will result in worsening off-exchange executions. This commenter provided two examples of situations in which off-exchange executions might worsen. The first is an ATS that provides execution mechanisms based on the NBBO.[1476] As explained in section VII.B.3.a, the reduction in access fees and corresponding reduction in rebates will not change the net spread on exchange. This means the cost of liquidity will not materially change. There is no

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1474 See Goldman Sachs Letter at 8.

1475 See Cboe Letter IV at 5: "…the NBBO is utilized by many market participants as a reference price for benchmark pricing and other risk functions. In addition, if on-exchange liquidity moves to off-exchange venues such as alternative trading systems, these trading centers commonly use the NBBO as a reference price for executing transactions, which will make transactions in off-exchange venues more expensive as well. Wider spreads are likely to most benefit wholesale broker-dealers, that may be able to offer more levels of price improvement, but at the expense of increased frictional costs for investors."

1476 See Cboe Letter IV at 5.

reason why ATSs that base execution prices off the NBBO cannot alter their pricing formulas to preserve the same execution prices (e.g., by executing inside the NBBO by a pre-determined amount). Indeed, a typical example of such matching mechanisms are mechanisms that match buy and sell orders at the midpoint, and this will not be impacted at all by a wider NBBO. The second example provided by the commenter was the case of retail wholesalers. The commenter states that these wholesalers "may be able to offer more levels of price improvement," but this will come at the expense of increased costs of trading from wider spreads.[1477] The Commission again disagrees with this assertion. Because the cost of liquidity will be largely unchanged, the price improvement[1478] acknowledged by the commenter will be capable of offsetting the change in quoted spread.

One commenter stated that eliminating the access fee would cost retail investors as much as $678 million per year.[1479] The commenter arrives at this estimate by using the BJZZ algorithm to identify retail trades from TAQ data,[1480] and computes the effective/quoted ratio (EQ ratio) for each trade.[1481] They assume that spreads will widen for all trades by 60 mils in the absence of rebates. They then apply the observed EQ ratio to the hypothetical 60 mil wider spreads in the absence of rebates to compute hypothetical transaction costs for retail investors under a world without rebates.

1477 See Cboe Letter IV at 5.

1478 Retail wholesalers frequently offer "price improvement" on orders they receive, where they execute the order on a principal basis at a price better than the NBBO.

1479 See Nasdaq Letter II at 6.

1480 "BJZZ" refers to the algorithm designed by Boehmer Ekkehart, Charles M. Jones, Xiaoyan Zhang, and Xinran Zhang. See Boehmer Ekkehart, et al., Tracking Retail Investor Activity, 76 J. FIN, 2249 (2021).

1481 The effective to quoted spread ratio computed as follows $EQratio = \frac{|Execution\ Price - NBBOmidpoint|}{NBBO\ Half\ Spread}$. It measures how close to the NBBO or NBBO midpoint a trade executes at. A trade executing at the midpoint would have an EQ ratio of 0, while a trade that executes at the NBBO would have an EQ ratio of 1.

The Commission disagrees with the commenter's assertion that retail traders will receive worse execution due to the reduced access fee cap. As this section describes, quoted spreads for stocks trading with more than one tick intra-spread are expected to widen on average by about 40 mils. However, the commenter's analysis relies on the assumption that the EQ ratio for retail order executions will remain constant.[1482] The commenter provided no evidence to support this assumption. This assumption is important because economically what matters is not the distance of the trade price from the NBBO, but rather the distance of the trade price from the midpoint – the effective spread. The effective spread covers the costs associated with providing liquidity as well as provides the liquidity provider's profits. Assuming a constant EQ ratio in the commenter's analysis implies that wholesalers internalize retail orders at prices that are farther from the midpoint, and thus the wholesaler will earn more money without providing any additional benefit to retail traders or their broker-dealers.[1483] Wholesalers are subject to competitive forces that apply at the level of average execution quality, and it is unlikely that market forces would allow such excess profits to wholesalers for no additional benefit to persist.[1484] It also seems unlikely that the EQ ratio would change mechanically with the NBBO

1482 The commenter's methodology is also flawed because the BJZZ algorithm they employ to identify retail trades has been shown in recent research as not being a very accurate measure of retail trading volume, See Brad M. Barber, Xing Huang, Philippe Jorion, Terrance Odean, & Christopher Schwarz, A(sub)penny For Your Thoughts: Tracking Retail Investor Activity in TAQ (working paper, Aug. 14, 2023), available at https://ssrn.com/abstract=4202874 (retrieved from SSRN Elsevier database. If the algorithm does not reliably identify retail trades then it is unclear what can actually be learned about retail trading volume from the exercise.

1483 The effective spread is defined as the signed difference between an order's execution price and the midpoint of the quoted spread; the larger the difference the less competitive the executed price is relative to the midpoint. Because the EQ ratio is equal to the effective spread divided by the quoted spread, the effective spread would have to increase at the same scale by which the quoted spread widens in order to keep the ratio constant.

1484 So long as there is some degree of competition, this argument would hold. A market that is more competitive may have retail effective spreads that would be lower, but in either case a change in the NBBO, with no other changes to wholesaler costs or competition would not be expected to change wholesaler profits.

because if the NBBO itself were the primary determinate of the price level at which retail trades were internalized, and wholesalers were free to choose any price level within the NBBO, then wholesalers would routinely internalize orders at or near the NBBO implying an EQ ratio for retail trades of near 1. This is not the case. Wholesalers currently internalize retail orders at prices that are significantly inside of the NBBO (i.e., EQ ratios significantly less than 1) suggesting that other factors besides the NBBO itself, such as distance from the midpoint, determine the transaction price of retail orders that are internalized by wholesalers.[1485] These price levels will still be feasible for wholesalers under the amendments, and so even with a wider NBBO, wholesalers are likely to transact retail orders at similar price levels under the amendments as they are today.

Put another way, economically there is no reason to assume that relaxing a non-binding constraint, in this case widening the quoted NBBO, would have an effect on existing equilibrium behavior. The NBBO does not constitute a binding constraint for wholesale execution of many retail trades.

In cases where the NBBO does constitute a binding constraint, there are two important missing pieces from the commenter's analysis. The first is that, for on-exchange execution, the wholesaler will pay a lower access fee. Assuming (as the commenter's analysis implicitly does) that the wholesaler does not pass on these lower fees at least in part to some investors assumes a lack of competitive dynamics in the retail execution market. Second, the commenter's methodology fails to take into account the expected reduction in quoted spreads for some stocks

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[1485] See Citadel Letter I at 33 showing EQ ratios ranging from .27 for small retail orders to .88 for very large orders, CCMR Letter at 35 showing average EQ ratios around .5 for the top three wholesalers and Charles Schwab, U.S. Equity Market Structure: Order Routing Practices, Considerations, and Opportunities. (2022) ("Schwab 2022 Whitepaper") at 9, 16, available at https://content.schwab.com/web/retail/public/about-schwab/Schwab-2022-order-routing-whitepaper.pdf (showing its EQ ratio of .33).

due to the reduction in the tick size. In cases where the NBBO constitutes a binding constraint on wholesaler price improvement, then wholesalers will offer better execution on these stocks. Moreover, there are cases in which current wholesale execution may fall between the spread under the new tick size, and the previous spread. In these cases, the new tick size creates a new binding constraint, leading to better execution for retail investors. So, if anything, the combined effect of the amendments could improve retail execution quality on average.

Additionally, as a general matter, some commenters stated that the lower access fee on exchanges will make exchanges a more attractive place to access liquidity.[1486] The Commission believes that the cost of accessing liquidity will decline for those stocks which continue to trade with a one-tick wide spread; the Commission, however, disagrees that the cost of accessing liquidity will change on average for other stocks.[1487]

Some commenters stated concerns that less liquid stocks may be more susceptible to any negative effects on liquidity from a reduction in rebates.[1488] Other commenters suggested that a higher fee cap should be adopted for illiquid stocks.[1489] However, adopting a separate fee cap for illiquid stocks would introduce more complexity into the market. The Commission's response is the same as the broader concern regarding posted liquidity: spreads may widen but the cost of accessing and providing liquidity will on average not change.

1486 See Healthy Market Letter at 23, BlackRock Letter at 11, BMO Letter at 3, and Themis Letter at 7-8.

1487 For stocks which do not trade with a one-tick wide spread the cost of accessing liquidity for any one instance may be higher or lower with a reduced fee cap, however on average the cost of accessing liquidity is not expected to change for those stocks. See supra section VII.B.3.b for additional discussion.

1488 See Nasdaq Letter II at 5-7: "This peril is particularly acute for thinly-traded securities." and Virtu at 10: "The reduced incentives for liquidity in thinly traded securities is especially concerning given how much liquidity improvements actually reduce an issuer's cost of capital and impact their ability to attract investors." See also Virtu Letter II at 10, Tastytrade Letter at 2.

1489 See Citigroup Letter at 6, TRP Letter at 4-5.

One commenter stated a reduction in rebates would lead to the exit of liquidity providers, harming competition,[1490] a lower access fee cap is expected to reduce the fees which are used to fund rebates and consequently rebates are expected to also see a reduction. The Commission acknowledges that profits of liquidity providers may fall because for stocks that remain tick-constrained, the access fee represents a transfer from liquidity demanders to liquidity providers. However, a net decrease in competition could serve to widen the spread beyond a single tick and increase the proceeds of liquidity provision thus incentivizing liquidity provision. While the Commission anticipates and is sensitive to costs to some affected parties, the Commission expects investors, more broadly to benefit.[1491]

Another commenter stated that lowering the access fee cap would result in a "liquidity gap"; that “it is unlikely that the liquidity gap would be met by other market participants;” and that "as spreads further widen, any cost savings non-retail investor participants realize from a reduction in the access fee cap are likely to be more than consumed by the rising frictional costs."[1492] The Commission disagrees that lowering the access fee cap would result in a liquidity gap that market participants would not be able to fill, because if quoted spreads widen beyond any reduction in maker rebates, liquidity providers would stand to earn higher proceeds by supplying at the wider spread. The Commission believes that competition among liquidity providers will keep the cost of accessing liquidity from rising on average in securities where the minimum quoting increment is not a meaningful constraint.[1493] In those stocks that trade with a

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1490 See Virtu Letter II at 19, Cboe Letter III at 3-4.

1491 Some Commenters agree. See, e.g., Verret Letter I at 9, Retirement Coalition Letter at 2, Themis Letter at 7, ASA Letter at 4.

1492 See Cboe Letter IV at 3, 5; see also Cboe Letter III, at 6.

1493 See section VII.B.3.

quoted spread equal to the tick size, the Commission expects that the reduction in access fees will reduce the net cost of accessing liquidity.[1494] Therefore, non-retail investors would likely see a reduction in overall frictional costs. Finally, one commenter stated that reducing the access fee cap for stocks priced less than $1.00 would impact an exchange's ability to differentiate itself, and the estimated decrease in transactions revenue from these stocks would limit its investments in innovation and technologies.[1495] The impact on an exchange's ability to offer different fees and rebates for stocks priced less than $1.00 is not likely to be large as there is not a substantial degree of differentiation across exchanges currently.[1496] Most exchanges charge fees near or at the fee cap to liquidity takers, and only two exchanges offer rebates to liquidity takers. This is unlikely to change following a decrease in the fee cap. The Commission acknowledges a loss in revenue due to the reduction in rebates for stocks priced below $1.00. It is possible that this could impact exchange investment in new technologies. However, as discussed above in this section, the amendments to Rule 612 are anticipated to lead to more volume on exchange, and hence more trading revenue to exchanges, offsetting this effect. Moreover, as discussed earlier in this subsection, it is necessary to conform rebates for stocks priced below $1.00 with those for stocks priced above $1.00.

One commenter suggested implementing the amendments to reduce the access fee caps before the minimum pricing increments to isolate the impact of the access fee cap on its own.[1497] The Commission has separately considered the impact of the amendments to Rule 612 with the

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1494 Id.

1495 See Cboe Letter II at 9; see also Cboe Letter IV at 1.

1496 See supra Table 4 and surrounding discussion.

1497 See State Street Letter at 5, stating: "We recommend … [i]mplementing any changes to access fee caps before changing quoting increments, to isolate and evaluate the effects. This includes examining whether reducing the access fee cap may affect a security's designation as 'tick-constrained.'"

new access fee in place; specifically, the change in the access fee will cause quoted spreads to widen, which may cause some stocks that currently would qualify for a reduction in their tick size under the adopted amendments to Rule 612 to no longer qualify for such a reduction.[1498] However, many stocks will continue to qualify. While the Commission acknowledges that postponing amendments to Rule 612 would allow for time to study the access fee cap in isolation, there is no mechanism by which a reduction in the access fee cap, on its own, would yield the full benefits of the proposed amendments to Rule 612.

The Commission acknowledges that changing the access fee cap at the same time that the changes to Rule 612 are implemented will cause some stocks assigned to a narrower tick size to immediately trade with a quoted spread too wide to qualify for continued assignment to the $0.005 tick size bucket. However, a delay in implementing changes to Rule 612 would delay the accrual of the other benefits the Commission has identified for these changes.

d. Other Effects of the Access Fee Cap Reduction

The Commission anticipates additional benefits inherent to adopting a lower access fee cap for all securities.

Access fees that fund rebates contribute to complexity in markets because they separate both the true cost of demanding liquidity and the proceeds from supplying liquidity, as represented by the quoted half-spread. Commenters stated that lowering the access fee cap to 10 mils would reduce complexity; one commenter stated in the context of supporting a significant reduction in exchange access fees, that current pricing models "contribute to market complexity by encouraging rebate arbitrage strategies and the proliferation of new order types and trading

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[1498] See supra Table 7, note a.

venues designed to exploit different transaction pricing models."[1499] Similarly, a second commenter supported a 10 mil fee cap and stated that maker-taker models, "introduce unnecessary market complexity through proliferation of new exchange order types (and new exchanges) designed solely to take advantage of pricing models."[1500] The same commenter stated that maker-taker pricing may drive orders off exchanges to avoid access fees, and "benefit sophisticated market participants, like market makers and proprietary traders, at the expense of other market participants."[1501]

One manifestation of this complexity is the potential conflict of interest between broker-dealers and their customers.[1502] Multiple commenters stated that a benefit of a lower access fee cap is that it would mitigate such potential conflicts of interests.[1503] Other commenters disagreed.[1504] Some commenters state that due to the complexity, opacity, and potential conflicts inherent in the rebate structure, the Commission should go further than in the current adopted amendments and ban rebates altogether. [1505] The Commission agrees that lowering the access fee cap reduces complexity and may help alleviate potential conflicts of interest.

Finally, the reduction in the access fee cap will improve market quality for stocks that remain tick-constrained. While the amendments to Rule 612 create a smaller tick size for stocks with narrow spreads, spreads naturally vary over time and this variation introduces the possibility

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1499 See Vanguard Letter at 6.

1500 See BMO Letter at 3.

1501 See id.

1502 See supra note 1518 and surrounding text discussing the potential conflicts of interests that exchange fees and rebates may introduce.

1503 See infra note 1514.

1504 See, e.g., Nasdaq Letter I at 2.

1505 See Harris Letter at 4-5, and We The Investors Letter I at 7, arguing that the Commission should go further and ban the use of rebates.

that some stocks could be misassigned to a tick size because trading in the operative period differs from the evaluation period due to factors exogenous to the tick change.[1506] Panel A of Table 10 shows that approximately 13.7% of aggregate share volume will be a false negative under the amendments[1507]—that is, this volume will be assigned a penny tick, but will trade at a TWAQS below $0.015 and therefore trade with a tick-constrained spread a majority of the time. Moreover, some stocks may remain tick-constrained, even at the new half a penny tick. Reducing the access fee cap would lower the cost of accessing liquidity because fee-funded rebates serve as a pure tax on liquidity demanders whenever the spread is tick-constrained (creating a wealth transfer from liquidity demanders to liquidity providers); the reduction in the access fee cap will also reduce the excess supply of liquidity at this price floor.[1508]

3. Exchange Fees and Rebates Determinable at the Time of Execution

In the current environment, as discussed in section VII.C.2, market participants often have to make trading decisions without the ability to determine the exchange fees and rebates they incur at the time of execution, and a market participant's total cost of trading can vary by a significant amount for orders with the same quoted execution price once exchange fees and rebates are accounted for. Current exchange fees and rebates are often based on the participant's relative contribution to the exchange's monthly trading volume during the contemporaneous month, and market participants need to grapple with the uncertainty of forecasting future market

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1506 See section VII.D.1.d for discussion and analysis of the tradeoffs inherent in tick assignment.

1507 This number corresponds to an evaluation period of three months and an operative period of six months, which are the parameters of the rule text. See section VII.D.1.d.

1508 As discussed above (e.g., supra section VII.B.2), a binding price floor on liquidity results in more liquidity supply than demand. Maker-taker pricing exacerbates this problem by taxing demand and subsidizing supply at the price floor. By reducing the access fee, the excess supply is lessened. The lower cost of accessing liquidity can also extend to stocks which trade with a TWAQS greater than $0.015 to the extent to which these stocks may occasionally trade with a spread equal to the tick size.

outcomes should they wish to know what their trading costs are at the time that they execute a trade.[1509] Requiring fees and rebates to be determinable at the time of execution will result in the benefits of increased transparency as to what fees and rebates broker-dealer members are committed to pay when they trade, reducing potential conflicts of interest, and potentially improving broker-dealer routing decisions. These amendments will also result in costs to exchanges associated with revising existing fee schedules to bring them into compliance with the adopted amendments.

The Commission received comments from a broad range of commenters who expressed support for Proposed Rule 610(d) because it would provide enhanced transparency surrounding transaction fees and rebates and alleviate concerns related to potential conflicts of interest.[1510] For example, one commenter stated that it agreed with the Commission's analysis of the benefits of making fees and rebates determinable at time of execution.[1511] Another commenter stated that it agreed with the Commission's assessment "…of how existing exchange pricing tier models can negatively impact market participants behavior."[1512] A third commenter stated that the Rule will "help to make overall trading costs more transparent."[1513]

Multiple commenters pointed out the potential for exchanges' pricing models to create a conflict of interest for broker-dealers who route multiple customers' orders to the exchanges.[1514]

1509 See also Proposing Release, supra note 11, at 80292 for a discussion of the complexity of fee schedules and the difficulty in forecasting fees for a contemporaneous period.

1510 See section IV.E for a discussion of the comment file.

1511 See Council of Institutional Investors Letter at 4.

1512 See BMO Letter at 4,

1513 See Retirement Coalition Letter at 2.

1514 See Vanguard Letter at 6 ("These pricing models can create conflicts of interest with a broker's obligation to obtain best execution for a customer . . . "); STA Letter at 7 ("Today, the primary concerns on access fees are how they contribute to the maker/taker or taker/maker pricing models offered by exchanges and the

One commenter stated that the benefits of pricing determinable at time of execution include "help[ing] broker-dealers make better order routing decisions," and reducing order routing incentives based "on achieving a threshold to gain a specific fee or rebate."[1515] Another commenter also stated that exchanges have little incentive to make fees and rebates determinable at the time of trade because the fee and rebate structure creates "captive customers" that direct order flow to a given exchange in hopes of receiving a given fee or rebate tier in a given month.[1516] One commenter agreed that fees determinable at time of execution has "the potential" to facilitate pass-through of fees and rebates to broker-dealers' customers, and thereby alleviate concerns about "perceived" conflicts-of-interest, but characterized such concerns about conflicts-of-interest as "misplaced."[1517]

As discussed in the Proposing Release, access fees create potential conflicts of interest between brokers and end customers to the extent that brokers can route orders to exchanges with worse execution quality for end customers but more advantageous fees (i.e., a low fee or a high rebate) for the brokers, which the brokers do not pass on to end customers.[1518] For example, a broker may route a customer's limit order to an exchange with a high rebate for liquidity provision, but a relatively low fill rate. The end result would be a high rebate payment for the broker but potentially poor execution quality for the customer.

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offshoots of conflicts of interests in the routing of customer order flow by broker dealers."); Retirement Coalition Letter at 2 "the use of rebates creates conflicts of interest, because when an institutional order is sent as a displayed order, the potential for a rebate may influence where a broker sends the order, even when the investor could receive a better execution on another market."); CII Letter at 3 ("The existing system disadvantages institutional investors because we believe rebates create the kinds of conflicts of interest identified in our policy.").

1515 BMO Letter at 4.

1516 See BMO Letter at 4.

1517 See Nasdaq Letter I at 32.

1518 See Proposing Release, supra note 11, at 80330.

One commenter stated that the supposition that rebates present conflicts of interest is not supported with evidence.[1519] There are, however, significant reasons to believe that rebates present a conflict of interest to agency brokers, even if there is uncertainty regarding to what degree those potential conflicts of interest are being acted upon. Namely, as described above, the quality of the execution accrues to the customer while the rebate accrues to the broker, which leads to a clear divergence of interests whenever the best rebate and the highest quality execution opportunities differ.

Having fees and rebates determinable at the time of execution will mitigate these potential conflicts of interest by increasing broker-dealer accountability to their customers.[1520] This is because the broker-dealer will be able to identify which fees and rebates are associated with which customer order, which at present is not possible at the time of execution.[1521] Having information about the fees and rebates paid as the order is filled will also improve a customer's ability to negotiate routing behavior and monitor the effects that fees and rebates have on its broker's order routing decisions and execution quality.[1522]

In addition, fees and rebates being determinable at the time of execution can make it easier for broker-dealers to pass the actual fees and rebates on to the end customer.[1523] Currently,

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1519 See Nasdaq Letter I at 2.

1520 See Proposing Release, supra note 11, at 80330.

1521 See supra note 1092 and surrounding discussion on information that customers can request from broker-dealers on net transaction fees and rebates through Rule 606(b)(3).

1522 One commenter agreed with the Commission's statement in the Proposing Release that fees being determinable only at the end of the month, as they are currently, impedes investors' ability to evaluate best execution and order routing. Council of Institutional Investors Letter at 4. The Commission believes that making fees determinable at time of execution will help investors make these evaluations, which can contribute to these discussions of fees with their broker-dealers.

1523 The Proposing Release discussed how the inability to know the fee or rebate at the time of a trade could render it difficult for a broker-dealer to pass on fees and rebates to customers to help avoid a potential

it can be difficult for a broker-dealer to pass on fees and rebates to individual customers because the exchange fee and rebate pricing tier into which a broker-dealer falls, which ultimately determines fees and rebates on an individual trade, is typically based on the broker-dealer's relative activity across the concurrent month and not an individual trade.[1524] With fees and rebates known at the time of execution, it could be possible for a broker-dealer to more quickly and easily determine the amount to be passed back to the customer. To the extent the amendments increase the proportion of exchange fees and rebates that broker-dealers pass through to end customers,[1525] this will benefit investors and also will reduce the potential benefits broker-dealers may receive from routing customer orders to exchanges with lower fees or higher rebates and thereby reduce distortions in customer order execution quality that this may cause.

A commenter agreed with the Commission's assessment in the Proposing Release that the ability of institutional investors and other market participants to evaluate order execution and routing is significantly impeded by a lack of determinability.[1526] A lack of determinability reduces the amount of information that a market participant can use when evaluating order execution and routing decisions. Without the fees and rebates being determinable, broker-dealers

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conflict of interest. See Proposing Release, supra note 11, at 80329. See also Council of Institutional Investors Letter at 4-5.

1524 See supra note 1084 and surrounding discussion on the current practice of volume-based fee tiers. While the Commission has described the tiered structure of many exchange fee schedules, the benefits of fees and rebates being determinable at time of execution do not depend on, or result from, the fee schedules using volume tiers. The amendments do not ban volume tiers; exchanges can continue to offer volume tiers as long as the tier is based on past—rather than future—volume. Likewise, the benefits of determinability apply even if volume tiers did not exist. For example, some exchanges offer incentives to market makers for frequent quoting at the NBBO—the amendments require that such incentives be based on past quoting at the NBBO so that market participants could determine with certainty their fee at the time of execution.

1525 See supra note 1087 and surrounding discussion on the current practice of broker-dealers passing fees and rebates through to customers.

1526 See Council of Institutional Investors Letter at 4-5.

may have difficulty transmitting information about fees and rebates to customers—the broker-dealer could not commit to a fee or rebate at execution, but would rather need to explain that uncertainty regarding fees and rebates could not be resolved until the end of the month—which may impede competition among broker-dealers.[1527] In contrast, under the adopted amendments, it will be possible for broker-dealers to relay such information about fees and rebates incurred by the broker-dealer to the customer at the time of execution.[1528] This will make the information more usable for customers such as institutional investors, increasing their incentives to ask for such information, as well as increasing the ability of the broker-dealer to transmit the information in a timely manner.

One commenter stated that, "[f]ew brokers route directly to the exchanges…Rather, most brokers pay to route their orders through larger '[direct market access] DMA' brokers to gain the benefit of the large brokers' exchange fee tiers. While the Proposal would simplify life for those few large DMA brokers and proprietary trading firms who closely track where they fall on exchange fee schedules, it wouldn't directly help the referenced Market Participants."[1529] The same commenter stated that most Market Participants, "judging by common practice today," would be unable to account for fees, and the requirements would not improve transparency for off-exchange trading where venues "are not required to charge standard fees, and where fees are often held as competitively sensitive secrets."[1530] The Commission agrees that under common

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1527 See Proposing Release, supra note 11, at 80336. Currently, customers' lack of timely information and certainty about the fees and rebates they incur on the execution of a trade can impact their choice of a broker-dealer for that trade.

1528 For example, under the adopted amendments, it might be possible to include such information in a report to the investor following the execution of their order.

1529 See Pragma Letter at 8.

1530 See id. at 8 ("Even if fees are determinable, it will provide little practical transparency for most Market Participants.").

practice today it can be difficult for most Market Participants to account for fees that are not determinable or known at the time of execution. That said, having exchange fees and rebates determinable at the time of execution will make it more likely that larger DMA brokers pass exchange fees and rebates on to their customers, including when these customers are small brokers routing their orders through them. That is because customers can better discuss fees and rebates with large DMA brokers, and the information will be more useful to customers because it is more timely. Also, while the requirements only apply to exchange fees and rebates, exchange and off-exchange trading venues compete, and transparency in exchange fees and rebates could prompt demand for greater transparency in off-exchange trading fees.[1531]

One commenter stated that rebate tiers increase aggregate liquidity, and that fee and rebate determinability will, "disrupt existing economic incentives," and, "negatively impact exchange liquidity provision and drive even more liquidity to off-exchange venues."[1532] Another commenter stated that this rule "disrupts existing economic incentives without justification,"[1533] and added that they "believe there is more aggregate liquidity in the marketplace because of the incentives provided by exchange rebate tiers." On the other hand, another commenter stated that when pricing is not determined until the end of the month, a "captive customer" is created, who "…must maintain levels of qualified trading activity or suffer an adverse economic consequence for up to an entire month's trading activity."[1534]

1531 See infra section VII.E.2 for additional discussion of the competitive effects of these amendments.

1532 See Cboe Letter II at 9-10.

1533 See Cboe Letter I at 9.

1534 BMO Letter at 4.

The Commission disagrees that fee and rebate determinability are likely to alter the economic effects related to fee and rebate tiers. Many of the incentives created by current exchange pricing schedules can be implemented by creating tier-based pricing schedules that are conditioned on historic (as opposed to future) activity, and such pricing would continue to be permissible under the amended rules.[1535] For example, a fee schedule might base the current fee or rebate tier on the share that the exchange member had of the exchange's total volume (or total consolidated volume) in the previous month.[1536] The incentives for meeting a volume tier would remain but the benefits of achieving the tier would be realized in the following month. Alternatively, a fee schedule might be based on the current month's absolute volume on the exchange (as opposed to share of volume), up until the moment of execution, which the exchange member would presumably know.[1537] Again, the incentive would be approximately the same. In general, an incentive that is based on some future quantity that cannot be known with certainty today could likely be replicated by offering the certainty equivalent,[1538] which can be calculated using a current or past quantity that can be known with certainty. This means that the uncertain portion of current fees is not strictly necessary to provide incentives. In this respect,

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1535 Such pricing can have not just benefits, but also costs. Tier-based volume pricing, for example, is used to incentivize the concentration of order flow—i.e., a member is incentivized to route orders to a particular exchange in order to qualify for a better pricing tier. This in turn creates a potential conflict of interest because the exchange member is incentivized to route customer order flow to the exchange for the purposes of tier qualification rather than maximizing other aspects of execution quality.

1536 Volume discounts like this, which are based on previous volume and then provide discounts on future purchases, have parallels in other industries (e.g., loyalty reward programs). Relative to the baseline, such a schedule would incentivize a customer to stay with an exchange for an additional month. However, there are ways exchanges might alleviate these concerns, such as a fee schedule that would induce a switch from one exchange to another.

1537 Exchanges could also create alternative incentive programs for new members provided these programs are comply with the requirements of the Exchange Act.

1538 A "certainty equivalent" is a term of art in economics, referring to the amount of a certain (that is, nonrandom) payment that must be given to an economic agent so that the agent would be indifferent between this payment and some random payoff.

any costs and benefits associated with volume-based fee tiering are not expected to change as a consequence of requiring fees and rebates to be determinable at the time of execution. Therefore, the benefits of the requirements that exchange fees and rebates be determinable at the time of execution will likely not include alleviating such "captive" customers.

One commenter stated that requiring fees to be knowable at the time of execution would make "participation in exchanges' growth programs more expensive in the initial month of participation."[1539] The Commission acknowledges that a new broker-dealer will not have a history of trading and therefore a tier schedule based on historical trading could not be implemented until the new broker-dealer has established a history; however, this history need not be long, and exchanges can cater to new and small broker-dealers by constructing tier schedules based on a short history.

One commenter stated that: "[R]equiring market participants to calculate their activity from the prior period in order to determine the volume fee and adjust their financial plans accordingly adds an unnecessary layer of complexity. The amount of effort required to understand the volume fee system, forecast volume fees for an upcoming period, and confirm that fees are indeed being calculated appropriately will especially disadvantage smaller brokers, who typically have less resources at their disposal for needless work such as this." [1540]

The Commission disagrees that the rule will add complexity. The rule removes the need for exchange members to perform forecasts in order to determine what fee they might be required to pay in a given moment. This is because, in order for a fee to be known at the time of execution as the amendments require, the fee cannot be based on activity that will happen after

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[1539] See Nasdaq Letter I at 33.

[1540] See Virtu Letter II at 11-12.

the execution. The Commission acknowledges, however, that fee schedules may remain complex. The rule however does not require more from small brokers than is required currently, namely it does not require them to understand the fee volume system, forecast volume fees (indeed it eliminates the need for forecasting), or to confirm that fees are being calculated appropriately. Thus the Commission does not expect this rule to disadvantage smaller brokers, and, to the extent that forecasting future market outcomes is more difficult for small brokers, this rule may make it easier for small brokers to compete.[1541]

Another commenter stated that determinable fees "would also limit exchanges' ability to incent market makers and other participants to quote at the NBBO and to do so in a large number of securities, including thinly-traded securities."[1542] The Commission disagrees because exchanges can continue to offer incentives based on past quoting at the NBBO in a large number of securities, including thinly-traded securities. Meaningful thresholds for pricing based on NBBO quoting activity can still be set based on historic activity, so that incentives to quote at the NBBO are expected to persist.[1543]

Another commenter stated that, "in order to achieve th[e] stated regulatory objective" of certainty as to an order's net fee and rebate price, and helping broker-dealers make better order routing decisions, "fees and rebates would have to be known prior to the time of execution (instead of at the point of execution, where the fee could vary based on the type of order being

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1541 See section VII.E.2.c for a discussion of the effect that fee determinability may have on competition.

1542 See Nasdaq Letter I at 33.

1543 For example, one exchange offers additional rebates to qualified market makers if, among other things, they quote at the NBBO at least 50% of the time during the month in an average of at least 2,700 symbols per day. See Nasdaq Stock Mkt. LLC, Equity 7, Sec. 114, available at https://listingcenter.nasdaq.com/rulebook/nasdaq/rules/nasdaq-equity-7 - section_114_market_quality_incentive_programs. Similar terms can be offered based on historic (rather than future) quoting.

accessed)."[1544] The Commission acknowledges that fees can vary based on order type—for example, removing hidden liquidity may incur a different fee than removing displayed liquidity, and the broker-dealer may not know whether the order will execute against hidden liquidity prior to the time of execution. In this case, there are two sources of potential uncertainty if fees are not determinable at execution: the broker-dealer's ultimate position on the exchange's fee schedule, and the type of liquidity that is accessed. Fee determinability allows broker-dealers to know, prior to execution, what their fee will be for each type of liquidity that might be accessed; the type of liquidity that is accessed may not be known until the time of execution. Resolving one source of uncertainty prior to execution (the broker-dealer's position on the exchange's fee schedule) can help broker-dealers make better routing decisions even if there remains uncertainty along other dimensions (e.g., the presence of hidden orders).

4. Acceleration and Implementation of the MDI Rules and Addition of Information About Best Odd-Lot Orders

The MDI Rules were designed to increase transparency into, among other things, the best priced quotations available in the market.[1545] The MDI Rules expanded NMS data and established a decentralized consolidation model, pursuant to which competing consolidators will eventually replace the exclusive SIPs for the collection, consolidation, and dissemination of NMS data.[1546] As discussed in section V.A, the Commission adopted a phased transition plan for

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1544 See Citadel Letter I at 25.

1545 MDI Adopting Release, supra note 10, at 18601-02, 18617; see also 17 CFR 242.600(b)(82).

1546 See MDI Adopting Release, supra note 10.

the MDI Rules,[1547] which has been delayed.[1548] Because the MDI Rules are not yet implemented, information about odd-lot orders in NMS stocks is only available on individual exchange proprietary data feeds, and market participants interested in quotation information for individual odd-lot orders must purchase these proprietary feeds.[1549] Due to the delays in the MDI Rules' implementation, as discussed in the Proposing Release,[1550] the Commission is adopting an accelerated implementation schedule, with some modifications from the proposal, so that market participants, including investors, will be provided with the enhanced transparency benefits earlier than anticipated in the MDI Rules.

The amendments will result in four changes to NMS data. Two of the changes will accelerate the implementation of specific aspects of MDI, namely the round lot definition and the inclusion of odd-lot quotations priced better than the NBBO in NMS data. This acceleration will result in realizing the economic effects of these MDI Rules sooner. The Commission acknowledges that the economic effects of the acceleration will be temporary, only lasting until the accelerated aspects of the MDI Rules would otherwise have been implemented.[1551] The amendments will also impose a new requirement on the exclusive SIPs to disseminate the accelerated odd-lot information until the exclusive SIPs are retired, the effect of which is to

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1547 See Proposing Release, supra note 11, at 80295 (describing the phased transition plan for the MDI Rules).

1548 See supra notes 74-78 and accompanying text.

1549 See MDI Adopting Release, supra note 10, at 18599. SIP data includes odd-lot transaction information but does not include odd-lot quotation information, except to the extent that odd-lot orders are aggregated into round lots pursuant to exchange rules; see also MDI Proposing Release, supra note 744, at 16739; MDI Adopting Release, supra note 10, at 18727. SIP data includes odd-lot transaction information but does not include odd-lot quotation information, except to the extent that odd-lot orders are aggregated into round lots pursuant to exchange rules; see also MDI Proposing Release, supra note 744, at 16739; MDI Adopting Release, supra note 10, at 18727.

1550 See Proposing Release, supra note 11, at 80295.

1551 See supra section V.E for further discussion on the MDI Rules Implementation.

result in the odd-lot information being disseminated sooner.[1552] The amendments, however, present the possibility that the new requirements on the SIPs can reduce competing consolidator competition if the additional requirements dissuade some market participants from choosing to become competing consolidators, which could reduce the expected benefits of the MDI Rules.[1553] The amendments will also require the dissemination of a standardized best odd-lot order or BOLO. The primary economic effect of this requirement will be to provide an additional standard benchmark that market participants could use to gauge execution quality—particularly for smaller or odd-lot orders.[1554]

Commenters questioned the sufficiency of the proposed 90-day implementation timeline for the acceleration of MDI Rules and the addition of the BOLO to NMS data. One commenter discussed the need for downstream programming changes for a variety of market participants: SIPs, recipients of market data, and broker-dealers.[1555] This commenter stated that implementation is likely to take over a year. Several other commenters stated that implementation will take longer than 90 days.[1556] One commenter discussed changes required for the SIPs: "The changes required for SIPs are relatively straightforward from a conceptual

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1552 See infra section VII.E.2.c for additional discussion of this effect. While the Rule requires the exclusive SIPs to distribute odd-lot data, the MDI Rules do not require the competing consolidators to disseminate odd-lot data. However, the MDI Adopting Release anticipated that at least one competing consolidator will do so because there would be demand for the data. See supra section VII.C.3.

1553 See infra section VII.E.2.c for additional discussion of MDI acceleration and the potential effect on competition between competing consolidators. Requiring the SIPs to disseminate odd-lot information may make the SIPs more likely to become competing consolidators and give them a first-mover advantage over other competing consolidators. However, this advantage is likely to be limited because competing consolidators can offer a lower latency than the SIPs currently provide, and can offer depth-of-book data in addition to odd-lot information.

1554 See infra section VII.D.6.a.ii for additional discussion on how the BOLO will make it easier for market centers and broker-dealers to compute statistics on price improvement relative to the best available displayed price, now required by amended Rule 605.

1555 See NYSE Letter I at 7.

1556 See FISD Letter at 3, Cboe Letter II at 11, and BlackRock Letter at 12.

perspective but will require significant undertakings before they can be implemented." This commenter then discussed the necessary steps, including: notice and lead time that data providers must give their clients; product decisions vendors need to make; development and testing for exchanges, vendors, and subscribers; traffic and capacity decisions given the change in message traffic; and communication and education for end users.[1557] Another commenter mentioned costs from converting round lots to actual share size in processing and display systems.[1558] The Operating Committee of the CTA-UTP Plans commented on the need for system design, equipment procurement, and industry testing.[1559] This commenter referenced a 2022 Odd Lots Proposal by the SIPs, which estimated a 10-12 month time frame for providing only top-of-book odd-lot quotations by the SIPs; given the additional requirements in the Proposal, the commenter estimated that implementation would take more than 12 months.

In light of these comments, the Commission is modifying the proposed compliance date for the round lot and odd-lot information definitions to extend the time for compliance. The Commission acknowledges that, all else equal, a shorter implementation timeline may result in greater total costs for the acceleration of the MDI Rules. Consistent with what commenters suggested was necessary for systems changes and testing among a variety of market participants, the adopted amendments extend the proposed compliance date for round lot definitions to approximately 12 months after the effective date of the amendments; for odd-lot information, the compliance date is extended to approximately 18 months after the effective date.[1560]

1557 See FISD Letter at 2-3.

1558 See Cboe Letter II at 11. The commenter did not provide an estimate of these costs, only stating that, "round lot conversion to actual share size will likely require considerable work by industry participants to their processing and display systems."

1559 See CTA-UTP Letter at 1.

1560 See section VI.C.

The 12-month implementation timeline for the round lot definition aligns with the compliance date for the amendments to Rule 612, allowing for the amended minimum pricing increments and new round lots to begin concurrently. This concurrence is expected to reduce the potential for operational risks and investor confusion from changing systems separately for both the amendments to Rule 612 and the acceleration of the MDI Rules, and reduces operational risks from a compressed timeline. Further, to the extent that commenters specifically discussed the timeline needed for the round lot definition implementation (as opposed to the timeline needed for both the round lot and odd-lot information definitions), no commenter stated that the round lot definition would require more than 12 months.

The longer 18-month implementation timeline for the odd-lot information definition is commensurate with the added complexity of disseminating new data fields for odd-lot quotations at multiple levels inside the NBBO. Additionally, the 18 month timeline is broadly consistent with the 10-12 month timeline that the SIPs estimated to be necessary for the 2022 Odd Lots Proposal; the longer timeline for the odd-lot information in these amendments allows for the fact that odd-lot information in these amendments includes quotations at each price level inside the NBBO, whereas the 2022 Odd Lots Proposal only included top-of-book odd-lot quotations. Further, the SIPs have been discussing the addition of odd-lot quotation information to the SIP data for several years and should be able to make the necessary adjustments to their processors in the adopted timeline. Finally, no commenter stated that the odd-lot information definition would require more than 18 months to implement. The adopted timeline allows market participants more time for each of the steps required for implementation than was initially proposed, which will address the concerns raised by commenters and help market participants to complete the

tasks in a cost-effective manner. The compliance costs discussed in section VII.D.5.c reflect costs associated with the adopted timeline.

a. Round Lot Definition

As discussed in the Proposing Release,[1561] the round lot definition in the MDI Rules will result in numerous economic effects, and the amendments will result in realizing these effects sooner. The primary effects stem from the MDI Rules round lot definition shrinking the NBBO for stocks priced greater than $250.[1562] Other effects of changing the round lot definition include increased transparency and better order execution,[1563] as well as any effects from potentially having more orders routed to exchanges instead of ATSs.[1564] The costs of changing the round lot definition derive from upgrading systems to account for additional message traffic and modifying and reprogramming systems.[1565] The Commission also expects that changing the round lot definition will impact the mechanics of other rules and regulations.[1566] These economic

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1561 See Proposing Release, supra note 11, at 80330.

1562 See MDI Adopting Release, supra note 10, section V.C.1(b)(i), for the full discussion of the effect of changing the round lot size on the NBBO.

1563 See MDI Adopting Release, supra note 10, at 18744-47 for the full discussion of the effect of changing the round lot size on transparency and execution quality. See FIA PTG Letter II at 4 for agreement from a commenter.

1564 See MDI Adopting Release, supra note 10, at 18747 for the full discussion of the effect of changing the round lot size on exchange competition and order routing.

1565 See MDI Adopting Release, supra note 10, at 18748 for the full discussion of the expected costs of changing the round lot size. See also infra section VII.D.5 for an estimation and discussion of these compliance costs as they pertain to the proposed acceleration.

1566 See MDI Adopting Release, supra note 10, at 18749 for the full discussion of the effect of changing the round lot size on other rules and regulations. The round lot definition will mechanically tighten the NBBO, which is used as a reference price for numerous rules. The reference prices used for the Short Sale Circuit Breaker and LULD Plan will be affected, though these Rules will continue to function consistent with their stated purposes. The NBBO is also used as a benchmark for SRO rules such as RLPs, exchange market maker obligations, and for some order types; exchanges could propose rule changes to maintain the current operation of these rules. Finally, the round lot definition could increase the benefits of 606(b)(3) reports because it could result in an increase in the number of indications of interest in higher priced stocks that will be required to be included in 606(b)(3) reports.

effects will be realized earlier than is currently estimated under the existing MDI timeline because this portion of the MDI Rules is currently not set to be implemented until the end of the implementation timeline for the MDI Rules. Further, because the first steps of the timeline for the MDI Rules have not been accomplished,[1567] and the Commission is uncertain when exactly the round lot definition otherwise will be implemented, the degree of the effect of the acceleration is unknown.[1568]

The Commission recognizes that the earlier implementation of the round lot definition could affect the tiered tick structure by sooner increasing the number of stocks subject to a minimum pricing increment of less than $0.01, but the Commission does not expect this effect to be substantial. Specifically, a mechanically tighter NBBO will reduce the time-weighted average quoted spread used to determine the appropriate tick increment for stocks priced greater than $250. However, higher-priced stocks also tend to have higher spreads that are unlikely to narrow enough for the amendments to result in a smaller minimum pricing increment.[1569]

As discussed in the Proposing Release[1570], the Commission also recognizes that both the reduction in tick size and accelerating the definition of round lot will reduce the depth of liquidity at the NBBO. These effects might amplify each other in a small set of stocks. A reduction in tick size will spread liquidity across more price levels, while the implementation of

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1567 See supra notes 74-78 and accompanying text section for a discussion of the delays.

1568 See supra section V.B.1 for a discussion of the factors that affect when MDI will be implemented and a discussion of an estimate of the proposed acceleration of at least two years after the Commission's approval of the plan amendment(s) required by rule 614(e).

1569 In the MDI Rules the Commission estimated an average reduction in quoted spreads, conditional on the round lot definition resulting in a reduction of roughly 15% for stocks priced $250-$1,000 and 28% for stocks priced $1,000-$10,000. Given the average quoted spread of $0.35 for stocks priced $250-1,000 and $2.90 for stocks priced $1,000-$10,000 the expected mechanical reductions are likely not sufficient to reduce the spreads of many of these stocks to the point where they would qualify for a lower tick size in this proposal. See MDI Adopting Release, supra note 10, at 18743.

1570 See generally, Proposing Release, supra note 11.

the round lot definition will result in displaying smaller quotes at the NBBO. The amendments could result in this effect being amplified for stocks that trade above $250 with spreads narrower than $0.015 as these stocks will receive both smaller tick and smaller round lot sizes. The number of such affected stocks is likely very small.[1571] The reduction in depth at the NBBO will temporarily reduce the information about liquidity available in the market for market participants who rely on public data feeds. However, the eventual inclusion of the depth of book information in consolidated market data under the MDI Rules, once implemented, will render this effect temporary. At that point in time, consolidated market data is expected to contain depth information at more price points, which will largely counteract the effects of a reduction in displayed depth from the implementation of the round lot definition and even from a reduction in tick size.

Multiple commenters further discussed the potential interaction of the reduction in tick size and the MDI round lot definition. One commenter stated that the resulting reduction in depth at the NBBO would make the NBBO less relevant and subject to more instability: "With a lower notional value earning protected status at the NBBO, even accessing 100 shares of liquidity would likely move a stock in one of the new tiers' multiple price levels. Furthermore, these smaller notional amounts reduce the risk taken to queue jump displayed orders by placing slightly more aggressively priced orders ahead of them." [1572] A separate commenter stated that the reduced liquidity at the NBBO will require investors executing large orders to, "sweep across multiple market centers, exposing them to greater execution risk. Together, these changes would

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[1571] See section V.B.3.b for analysis identifying such stocks. In particular, see supra note 801 identifying only two stocks—both highly liquid—that would have qualified for both the tick reduction and a reduction in the round lot as of Nov. 30, 2023.

[1572] See RBC Letter at 5. Queue jumping in this context is synonymous with pennying. See supra note 994.

reduce the depth at the NBBO, leaving it subject to greater volatility and, in turn, reducing reliability and execution quality for retail investors." [1573]

The Commission acknowledges that these are possibilities, but the interaction of the reduction in tick size and the MDI round lot definition is not expected to have a material impact on the NBBO of affected stocks. In order for a stock to be impacted by both the new round lot categories and the smaller tick size, it would need to have a price over $250 with a spread below $0.015; this implies that the percentage spread must be below 0.006%.[1574] To put this in perspective, consider the sample of all stock-days in 2023.[1575] For each stock-day, divide its TWAQS by its price to measure its percentage spread. Only 1% of this sample has a percentage spread below 0.015%—i.e., the first percentile of the sample's percentage spread is 2.5 times higher than the percentage spread of the stocks affected by both the new round lot categories and the smaller tick size.[1576] This implies that the affected stocks are exceptionally liquid—they are well within the first (i.e., most liquid) percentile when liquidity is measured using percentage spread. The exceptional liquidity of the affected stocks will likely protect their NBBO from material deterioration.

The Commission does acknowledge that the amendments will increase the likelihood that a 100-share order will walk the book for stocks affected by both a reduction in the tick and the

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1573 See Virtu Letter II at 8.

1574 The percentage spread measures the cost of liquidity, measured here as the spread, as a fraction of the execution price. A lower percentage spread indicates that transaction costs for liquidity demanders are a smaller fraction of the execution price. Here, $0.015/$250 = 0.00006 = 0.006%.

1575 A symbol-day is the unique pair of a stock symbol and a date. For example, one observation is AMZN on December 7, 2023; a second observation is AMZN on December 8, 2023; a third is AAPL on December 7, 2023, etc.

1576 This statistic is computed using all symbol-days in WRDS intra-day indicators for the year 2023. The sample has 2.3 million observations.

round lot definition;[1577] however, the high price (over $250 per share) of the affected stocks implies that the notional amount of such an order will be substantially larger than the notional amount of a 100-share order for a typical stock unaffected by the MDI Rules round lots. Therefore, a round lot under the new definition will continue to reflect a meaningful notional amount even with a reduced number of shares,[1578] thereby ensuring that regulatory protections for round lots—such as those governing the display, dissemination, and protection of orders under Rules 602, 604, and 611—continue to focus on orders of significant size. Likewise, the amendments will increase the likelihood that particularly large orders may need to sweep across multiple market centers; however, fixing the notional amount of an order, a high-priced stock will require fewer shares, which reduces the need to sweep across multiple market centers. Therefore, the amendments will continue to protect a meaningful notional amount at the NBBO after the round lot size is reduced for these high-priced stocks. Similarly, the amendments will make it incrementally easier for traders to queue jump—i.e., penny—protected orders in affected stocks, but pennying will remain difficult due to the relatively high price of the affected stocks. That is, a trader would still need to commit a relatively high notional amount to jump the queue with a protected order. Finally, the concern with pennying is that a market participant can jump the queue by posting economically trivial price improvement; for the stocks affected by both the

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1577 A marketable order "walks the book" if the size of the order is larger than the amount of liquidity available at the best price at a market center; the order must therefore execute against liquidity at multiple price points within the limit order book.

1578 For example, the notional amount reflected by a round lot of 40 shares will generally be greater than $10,000 (this is because a stock's price must generally be greater than $250 to be assigned a round lot of 40 shares, and 40*$250 = $10,000). If a stock has a round lot of 100 shares, a round lot will only reflect $10,000 of notional if the stock price is at least $100 (so that 100*$100=$10,000); many stocks with a round lot of 100 shares do not have a price greater than $100. Therefore, the lower round lot for high-priced stocks will continue to reflect a notional amount that is at least as high as the notional reflected in round lots for stocks with more common prices.

tick reduction and the round lot definition, however, posting a protected order that improves on the NBBO is likely to provide meaningful price improvement. To jump the queue with a protected order, a trader would need to post an order that is: (1) priced better than existing orders by $0.005 (which is large relative the stock's typical spread of under $0.015), and (2) with a $10,000 notional value[1579] (which is larger than the notional value required to queue jump for stocks priced under $100). Such an order would thereby require the trader to offer price improvement that is economically large relative to the costs of trading the stock, and relative to the notional amount required to jump the queue in most other stocks. Therefore, the Commission continues to expect that the acceleration of the round lot definition will protect a meaningful amount of liquidity at the NBBO for stocks receiving the tick reduction.[1580]

One commenter encouraged the Commission to "comprehensively review its proposed changes to tick sizes, access fees and round lots to better evaluate how these changes together would impact liquidity."[1581] As discussed in the preceding paragraphs, the Commission expects that a very small number of stocks (two as of Nov. 30, 2023[1582]) would be subject to both a change in round lot size and tick size because very few stocks have both a price above $250 (to qualify for a reduced round lot) and a TWAQS below $0.015 (to qualify for the tick reduction).

1579 The new round lot definitions are structured so that they protect $10,000 of notional value. See Table 1 of MDI Adopting Release, supra note 10.

1580 For example, suppose a trader wants to incrementally improve the NBBO by jumping ahead of a resting protected order. If the stock has a tick of $0.005 and a round lot of 40 shares, then the trader must improve the price by $0.005 and post an order with a notional value of at least $10,000, see id. The cost of queue-jumping is therefore at least $50 (0.005*$10,000). Now consider a stock with a tick of $0.01, a round lot of 100 shares, and a price of $30 per share. The cost of queue-jumping for this stock is only $30 (0.01*100*$30). Therefore, stocks that receive both a tick reduction and a reduced round lot under these amendments are not expected to experience more queue jumping—and consequent deterioration of the NBBO—compared to stocks that retain the penny tick and the 100-share round lot.

1581 See UBS Letter at 10.

1582 See supra note 801 identifying only two stocks—both highly liquid—that would have qualified for both the tick reduction and a reduction in the round lot as of Nov. 30, 2023.

The exceptional liquidity of the stocks with both these characteristics is unlikely to be materially affected by the interaction of the tick reduction and the reduction in the round lot. With respect to the reduction in the access fee cap, the Commission expects effects of that change to be independent of the effects of the round lot definition for two reasons. First, the reduction in the access fee cap is unlikely to affect a stock's round lot size. This is because the reduction in the access fee cap—to the extent that it affects quoted prices as discussed in sections VII.B.3 and VII2—is not expected to move quoted prices by more than one tick. Round lots, on the other hand, are determined by whether a stock is priced above $250, $1,000, or $10,000; the probability that the reduction in the access fee cap affects a stock's round lot assignment is therefore miniscule. Second, the reduction in the access fee cap and the reduction in the round lot are expected to have separate but unrelated effects on the NBBO. Stocks that receive a round lot less than 100 shares are expected to have a narrower NBBO because the new round lot definition will include quotes at better prices in core data that were previously excluded from being reported because they consisted of too few shares.[1583] Access fees do not affect the existence of these better priced quotes with fewer shares. The reduction in the access fee cap is expected to put upward pressure on quoted spreads and therefore widen the NBBO;[1584] this effect operates at a per-share level because fees and rebates are assessed per-share, making the number of shares in a round lot irrelevant. Therefore, the Commission does not expect the round lot definition to interact with the reduction in the access fee cap.

For institutions that do not purchase proprietary feeds, the MDI Rules once implemented will result in the display of five levels of depth-of-book in NMS market data. To the extent that

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1583 See MDI Adopting Release, supra note 10, at 18742.

1584 See section VII.B.3 for a discussion of the effect that fees and rebates have on quoted spreads.

the amendments result in liquidity spread out across more price levels due to the round lot reduction,[1585] then these changes would reduce the value of these NMS market data. However, the high price of stocks affected by the round lot reduction implies that the amount of visible notional liquidity will remain high relative the notional liquidity visible for a typical stock unaffected by the MDI round lots.[1586]

One commenter stated that, "the Commission failed to note how much actual volume takes place in any of the three proposed [round lot] tiers and what challenge, if any, changes to round lot definitions would address."[1587] In the MDI Rules, the Commission estimated that approximately 1% of stocks, 3% of share volume, and 30% of dollar volume will be affected by the new round lot tiers.[1588] The Commission also discussed in the MDI Rules the effect of changing the round lot size on transparency and execution quality.[1589]

The commenter further suggested that the implementation of the round lot definition could cause confusion among retail investors: "Currently, retail customers, especially those trading options, understand one option contract represents one hundred shares. Frequently, it is simply referred to as a 'round lot.' Changes in round lot sizes will most certainly create confusion in this area for retail investors."[1590]

1585 See supra note 1348 and surrounding discussion on the effect that the tick reduction is expected to have on the value of MDI NMS market data.

1586 See supra note 1578 for an example indicating that the amount of notional liquidity reflected in a round lot will generally be higher for stocks receiving a reduction in the round lot size than stocks that retain a round lot size of 100 shares (due to the higher price of stocks receiving a round lot reduction).

1587 See Tastytrade Letter at 22.

1588 See MDI Adopting Release, supra note 10, at 18743 Table 4.

1589 See supra note 1563.

1590 See Tastytrade Letter at 22.

The Commission acknowledges that there may be a learning curve associated with the new round lot definition. However, as discussed in the MDI Adopting Release, investor confusion will be temporary for four reasons. First, market participants already regularly trade in increments other than 100 shares.[1591] Second, most NMS stocks will continue to have a round lot of 100 shares. Third, core data will be distributed with the size of the NBBO and best quotes in shares rather than in the number of round lots. Fourth, broker-dealers and other market participants will modify or develop their systems to automatically keep track of the round-lot changes.[1592] Further, any confusion from the accelerated round lot definition would have occurred eventually under the original MDI timeline, so the incremental effect of MDI acceleration on investor confusion is minimal.

Other commenters expressed concerns about monthly updates to stocks' round lots. Each update requires market participants to "reconfigure their investment platforms and trading systems to make any modifications effective."[1593] The same commenter pointed out that, under the proposal, round lots would be assigned at discrepant intervals from tick assignments. Commenters also stated that these system updates may increase complexity and operational risk, and further contribute to investor confusion.[1594]

While any periodic system update can pose a risk of glitches, the amendments assign round lots and tick sizes on the same schedule—every six months in May and November.

1591 See supra note 791 and surrounding text for a discussion on the interaction of the new round lot definition and options trading. It is unlikely that the new round lot definition will confuse retail investors trading in options, partially because options markets already have standard contracts on stocks with a round lot size less than 100 shares.

1592 See MDI Adopting Release, supra note 10, at 18745.

1593 See BlackRock Letter at 9-10.

1594 See SIFMA Letter II at 34.

Syncing the updates like this will reduce costs relative to the monthly round lot updates in the baseline by reducing the number of times that firms are required to "open the hood" of trading systems. To further reduce these costs and provide opportunity for industry testing, the adopted amendments incorporate a one-month gap between evaluation periods and the implementation of updated round lots and tick sizes. It is possible that the amendments to the round lot definition—i.e., the less frequent evaluation periods and the lag between evaluation and implementation—may cause a stock's round lot to be less reflective of its price than would have otherwise been the case under the original MDI Rules round lot definition (e.g., if a stock's price falls after the evaluation period, it may be assigned to a round lot that is too low for the next six months). This imprecision in round lot assignment, however, is unlikely to significantly reduce the benefits of the MDI Rules for two reasons. First, to the extent that a stock is assigned a round lot based on stale information, this assignment will be corrected within six months at the next evaluation date. Second, given the significant distance between the round lot thresholds (i.e., $250, $1,000, and $10,000), any deviation in a stock's round lot as a result of these amendments is likely to be due to stocks that are near a threshold; for these stocks, the cost of being including in the next smallest or largest tier is likely to be small.

Finally, one commenter suggested alternative price thresholds for the round lot definition; these thresholds would result in five round lot tiers.[1595] The Commission continues to believe, as stated in the MDI Adopting Release, that a five-tiered approach is unnecessarily complex, and that the adopted tiers promote a smoother transition to a price-based round lot structure.[1596]

1595 See Pragma Letter at 9.

1596 See MDI Adopting Release, supra note 10, at 18618. The price-based round lot structure ensures that there is $10,000 of notional value protected under the new round lot definitions. See supra note 1579.

b. Including Odd-Lots in NMS Data

As discussed in the Proposing Release,[1597] the acceleration of the implementation of the MDI Rules that expand the NMS data to include odd-lot information inside the NBBO will result in sooner realizing some, but not all, economic effects of this aspect of the MDI Rules.[1598] The odd-lot information could be useful to consumers of SIP data that could use it to make better inferences about market conditions, thereby leading to investment decisions that more fully reflect market conditions and increased market efficiency. This odd-lot information could also lessen the effect of a reduction in displayed depth at the NBBO resulting from either a smaller tick size or a smaller round lot. Specifically, expediting inclusion of odd-lot data will allow individual investors whose broker-dealers subscribe to the data to visually monitor the market sooner than they would otherwise. [1599]

Multiple commenters remarked on the growing importance of odd-lot activity for the overall equities market. One commenter stated that odd-lots "provide a meaningful source of liquidity across all trading sessions and stocks, representing 54.8% of all trades in the U.S. financial markets, up from 43% at the beginning of 2020."[1600] Similarly, another commenter stated that including odd-lot information in consolidated market data will "improve transparency and increase the usefulness of the consolidated tape given the growing prevalence of market

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1597 See Proposing Release, supra note 11, section V.D.5.

1598 See MDI Adopting Release, supra note 10, section V.C.1(c)(i), for the full discussion of the effects of including odd-lot information inside the NBBO in its definition of core data. Also, the MDI Rules do not require that the competing consolidators to disseminate odd-lot information, but the Commission anticipated in the MDI Adopting Release that at least one would do so. The requirement that the exclusive SIPs disseminate odd-lot information helps ensure that the economic effects of the acceleration of the MDI Rules occur. See infra section VII.D.5.c for a discussion of the costs to the exclusive SIPs.

1599 See MDI Adopting Release, supra note 10, section V.C.1(c)(i).

1600 See Cboe Letter II at 10.

activity in sub 100 share quantities….Allowing for access to this information, as proposed, would therefore likely result in increased pre-trade transparency for both retail and institutional investors and bolster execution quality."[1601]

In addition, the amendments will change the timing and magnitude of compliance costs and other costs.[1602] One commenter estimated that quotation traffic will increase at least 35% as a result of adding odd-lot data to the SIP feeds; this estimate was based on a previous proposal by the CTA and UTP Operating Committees, which proposed a more limited inclusion of odd-lot data to the SIP feeds.[1603] The associated costs will include: the cost for exclusive SIPs to upgrade existing infrastructure and software to handle the dissemination of additional message traffic,[1604] the cost to SROs to implement system changes required in order to make the data needed to generate odd-lot information available to exclusive SIPs, and the cost of technological investments market participants might have to make in order to receive the SIP data.[1605]

While these aforementioned economic effects of including odd-lots in NMS data will be realized sooner, the Commission does not expect that the amendments will accelerate all the effects described in the MDI Rules related to adding to NMS data odd-lot information inside the NBBO. The amendments will not accelerate the decentralized consolidation model and will therefore not accelerate the benefits from allowing some market participants to reduce data

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1601 See BlackRock Letter at 11.

1602 See MDI Adopting Release, supra note 10, at 18759 for the full discussion of the costs associated with expanding core data to include odd-lot information inside the NBBO. See also infra section VII.D.5.c for further discussion of compliance costs.

1603 See FISD Letter at 3. The Commission agrees that the addition of information on odd-lot quotes that are priced at or more aggressively than the NBBO may substantially increase message traffic. See MDI Adopting Release, supra note 10, at n.2019.

1604 Multiple commenters agreed with the amendments' effect on message traffic. See, e.g., Citadel Letter I at 26 and FIA PTG Letter II at 4.

1605 See supra note 1602.

expenses required for trading by providing a reasonable alternative to some market participants to proprietary data.[1606] As such, the amendments will also not accelerate the cost to users of proprietary data whose information advantage will dissipate somewhat. In particular, the Commission does not believe that adding the specified odd-lot information to the exclusive SIPs will result in low-latency traders substituting the exclusive SIPs for their current proprietary data usage. This is because a key component of the MDI Rules for this functionality is an expected reduction in latency of NMS data anticipated from the competing consolidator model of NMS data distribution.[1607] The exclusive SIPs are not expected to be fast enough to replace proprietary data because existing SIP latency will not be reduced or affected by this Rule. Thus, the amendments will not accelerate the benefits anticipated in the MDI Rules that pertain to using low-latency odd-lot information. Instead, the Commission expects these effects to be realized after the implementation of all MDI Rules.

Market participants who decide to receive and use odd-lot quotation information from the exclusive SIPs under these amendments will also incur costs if the acceleration results in additional systems changes when competing consolidators begin offering odd-lot information. Specifically, market participants that decide to receive odd-lot quotation information from exclusive SIPs will need to make systems changes upon implementation of the acceleration of the MDI Rules in order to receive the odd-lot quotation information. Because the data specifications of the competing consolidators are unknown and could differ from the data specification of the exclusive SIPs, market participants receiving odd-lot information from the exclusive SIPs could also need to make systems changes again to receive the odd-lot information

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1606 Id.

1607 See MDI Adopting Release, supra note 10, at 18752 n.1939.

from a competing consolidator upon full implementation of the MDI Rules.[1608] If there are significant fixed costs associated with system changes that are incurred on each change, then multiple system changes will be inefficient and could increase costs. Because market participants who receive odd-lot quotation information from the exclusive SIPs may need to make an extra systems change stemming from this Rule—one change to receive the data from the exclusive SIPs, and potentially another change to receive the data from a competing consolidator—some market participants may decide not to implement systems changes to make use of the accelerated implementation of the odd-lot information and, instead, wait until the MDI Rules are fully implemented. This would dampen some of the benefits of accelerating the inclusion of odd-lot quotation information.

To the extent that some market participants store SIP data for various purposes (such as transaction cost analysis), the acceleration of the MDI Rules could hasten an increase in storage costs because the amount of SIP data increases with the inclusion of odd-lot data. Many factors affect these costs in total, such as the number of market participants storing SIP data, the data structures they use to store SIP data, whether these market participants will choose to store all or just some of the SIP data provided by the amendments, and the period over which the amendments will affect these storage costs. Because the Commission does not have information on how many market participants will store MDI odd-lot information and the methods they will use to do so, the Commission is unable to estimate these costs.

1608 One commenter pointed out that this duplication of effort becomes more likely if SIPs do not choose to register as competing consolidators. See BlackRock Letter at 12. The Commission agrees with this assessment.

One commenter stated that displaying odd-lot quotes "could lead investors to expect prices that are not available."[1609] The Commission acknowledges that there may be a learning curve associated with the dissemination of odd-lots on the SIP. However, any confusion from the accelerated dissemination of odd-lot quotes would have occurred eventually under the original MDI timeline, so the incremental effect of MDI acceleration on investor confusion is minimal. Further, as discussed in the MDI Adoption Release, the Commission acknowledges that many retail investors may not directly view the entire content of expanded core data—retail brokers may decide not to offer their customers direct access to all of the odd-lot information but may rather customize products derived from odd-lot information.[1610] The provider of these customized products is expected to supply the information in a way that does not confuse the provider's customers. To the extent that retail brokers allow some customers to directly utilize all of the odd-lot information, the customers who choose to do so will likely be sophisticated—as evidenced by their seeking out the information—and will likely not be confused.[1611]

c. Dissemination of Odd-Lots in SIP Data

The Amendments require the exclusive SIPs to disseminate odd-lot data.[1612] As discussed in the Proposing Release,[1613] this requirement will help realize the benefits of accelerating the implementation of including odd-lot information in NMS data while imposing costs on exclusive SIPs and potentially on market participants.[1614] The MDI Rules do not require the competing

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1609 See Schwab Letter II at 36.

1610 See MDI Adopting Release, supra note 10, at 18753.

1611 See MDI Adopting Release, supra note 10, at 18754.

1612 See 17 CFR 242.603(b)(3) for rule text relating to this requirement under Rule 603.

1613 See Proposing Release, supra note 11, at 80332.

1614 See infra section VII.D.5.c for additional discussion of the costs the exclusive SIPs are expected to incur.

consolidators to disseminate odd-lot data. However, the Commission estimated in the MDI Rules that at least one competing consolidator will do so because there will be demand for the data.[1615] These amendments, though, do not accelerate the competing consolidator model. Unlike competing consolidators, each exclusive SIP is the only distributor of the entirety of its data and may lack the incentive to disseminate the data. As a result, the Commission cannot rely on the exclusive SIPs to disseminate the odd-lot information prescribed by the MDI Rules absent a requirement to do so; the benefits of the acceleration could therefore be at risk without the Amendment to Rule 603's requirement for the SIPs to disseminate.[1616]

While the inclusion of the odd-lot data could impose costs on those who receive and use exclusive SIP odd-lot data,[1617] the requirement that exclusive SIPs disseminate the data could also impose costs on those who receive but do not have an interest in using odd-lot information provided in SIP data. These costs would vary based on how the exclusive SIPs decide to implement the dissemination of the MDI odd-lot information. For example, if the exclusive SIPs offer a separate data feed for odd-lot quotation information, then market participants that do not have an interest in this information may not incur any additional costs because they would not need to subscribe to this data feed. If the exclusive SIPs instead incorporate MDI odd-lot quotation information into an existing data feed, then market participants may incur costs to update their systems to filter out the unwanted odd-lot information; the Commission is unable to estimate these costs because they would vary across market participants and depend upon each

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1615 See supra note 1155.

1616 The Commission recognizes that the exclusive SIPs have some incentive to offer odd-lots as indicated by the exclusive SIPs seeking comment on doing so. See, e.g., Proposal of the CTA and UTP Operating Committees Regarding Odd Lots on the SIPs (Mar. 2022), available at https://www.ctaplan.com/publicdocs/ctaplan/CTA_Odd_Lots_Proposal_2022.pdf.

1617 These costs include systems changes and data storage. See section VII.D.4.b for a discussion of these costs.

market participant's existing infrastructure, which is unknown to the Commission. Further, such SIP data users could incur the cost of any SIP data fee increases intended to offset the costs to exchanges and exclusive SIPs.[1618] However, SIP data fees did not increase when the exclusive SIPs started to include odd-lot trades.

d. Best Odd-Lot Order Definition

The amendments go beyond the MDI Rules by requiring that NMS data also include information on the best priced odd-lot orders across all markets. Including the best odd-lot order in a standardized form will offer market participants a standard benchmark, like the NBBO, to use to measure execution quality. As discussed in the Rule 605 Amendments[1619] a market center may be able to internalize an order and claim price improvement relative to the NBBO even if better priced odd-lots are available at another market center. A standardized best odd-lot benchmark may give market participants that receive it valuable information for evaluating broker-dealers and market centers. Including this benchmark in NMS data allows the information to be readily available to a broad set of market participants, including those investors to whom broker-dealers choose to make this information available.[1620]

[1618] Any changes in fees for SIP data would need to be filed by the Equity Data Plans and approved by the Commission. See supra note 887 and accompanying text for further discussion.

[1619] See Rule 605 Amendments, supra note 10, section IX.D.b.2.c.vii for further discussion of the benefits of disclosing execution quality benchmarked to the best available displayed price.

[1620] Because the amount of information disseminated as a result of the amended rule BOLO dissemination requirement would likely result in significantly less message traffic compared to the amount of information that would be disseminated as a result of the amended rule MDI odd-lot information dissemination requirement, we expect market participants will be able to receive the BOLO information required here without having to make significant system upgrades, unlike the MDI odd-lot information. Therefore, a broader set of market participants may choose to receive the BOLO from the exclusive SIPs (and later on, competing consolidators) than all of the MDI odd-lot information. Additionally, because of the lower message traffic, more broker-dealers may make information on the BOLO available to their customers than MDI odd-lot information.

Currently, this information is only available to market participants who have proprietary data feeds, and even then there could be differences across market participants with these data in terms of how exactly market participants calculate the best odd-lot order (or how many proprietary feeds they include). The best odd-lot information in the NMS data will provide a standardized benchmark that reflects the best odd-lot price consolidated across all national securities exchanges and national securities associations. This benchmark may allow more market participants to better monitor the execution quality of their broker-dealers and send more trading volume to broker-dealers with better performance.[1621] One commenter highlighted the value of this new benchmark: "…transparency requires that the units used to represent the range of prices available in the market match the units in which participants typically quote and trade."[1622] For market participants who receive the BOLO and typically execute small trades, the best odd-lot order will provide them more relevant information on available orders. Thus, including the best odd-lot information could enhance competition among broker-dealers leading to better trade execution and perhaps a lower cost to customers for execution services.

One commenter expressed concern that the best odd-lot order would result in "displaying locked/crossed markets."[1623] It is possible for the best odd-lot bid to be at a price equal to or higher than the best odd-lot ask; in these cases, the best odd-lot order would show a locked or

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1621 While the Commission does not expect most retail traders would engage in this sort of benchmarking due to a lack of technical capacity to do so among most retail traders, institutional traders likely have such capacity and so would engage in this type of monitoring. Institutional traders have strong incentives to monitor all aspects of transaction costs as these costs can significantly affect portfolio performance. See Amber Anand, et al., Performance of Institutional Trading Desks: An Analysis of Persistence in Trading Costs, 25 REV. FIN. STUD. 557 (2012).

1622 See IEX Letter I at 31. Another commenter agreed more generally that the best odd-lot order will enhance the usefulness of odd-lot information and enhance liquidity—see Cboe Letter II at 10.

1623 See SIFMA Letter II at 34 requesting an analysis of the effect of the BOLO on the display of locked and crossed markets.

crossed market.[1624] Academic research shows that the NBBO does get locked and crossed from time to time.[1625] These tend to be fleeting events.[1626] Because the BOLO will provide prices inside the NBBO, the BOLO will likely be crossed or locked more frequently than the NBBO. However, it is unclear what practical effect a locked or crossed BOLO would have on financial markets or those that use the BOLO. Market participants are already well versed in using the NBBO, which can be locked and crossed from time to time, so it is likely that they would use similar techniques for dealing with locked and crossed markets when, for example, benchmarking relative to the BOLO.[1627] Further, market participants who subscribe to proprietary data feeds already have access to information on when the best odd-lot orders may lock or cross each other; the rule amendment merely extends this information to market participants who do not subscribe to proprietary data feeds. As more market participants see the information contained in the BOLO, there may be fewer instances of locked and crossed odd-lot quotes—e.g., more market participants will have the information needed to arbitrage crossed odd-lot markets. Finally, a locked or crossed BOLO will be less disruptive than a locked or crossed NBBO because Rule 610 of Regulation NMS requires SROs to adopt rules requiring their members reasonably to avoid displaying quotations that lock or cross protected

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1624 See supra note 1051 for the definition of locked and crossed markets. A locked or crossed market occurs when there is a passive buy order on one venue at a price greater or equal to the price of an existing passive sell order at another venue; the fact that these orders have not executed against each other indicates that there is a friction between the trading venues.

1625 See Craig W. Holden & Stacey Jacobsen, Liquidity Measurement Problems in Fast, Competitive Markets: Expensive and Cheap Solutions, 69 J. FIN. 1747 (2014). This paper estimates that 1.7% of trades occur when the NBBO is locked, and 0.5% of trades occur when the NBBO is crossed—see Table 1, Panel A, column 4 therein. The authors conjecture that some of these instances arise due to a data issue where quotes have been canceled, but the cancellation was not recorded by the time of the trade.

1626 Id.

1627 See Id. for an example of one methodology used when employing market data in the presence of locked or crossed markets.

quotations.[1628] However, the BOLO does not establish a protected quote, and so a locked or crossed BOLO would not trigger the same reaction by SROs and their members as a locked or crossed NBBO.

Other commenters discussed the effect BOLO may have on investor confusion. Two commenters stated that: "Calculating and publishing an odd-lot NBBO risks creating significant investor confusion due to the appearance that a new benchmark is being established even though odd-lots are treated differently than round-lots under Commission regulations. Rather than taking steps to prevent unnecessary investor confusion, the Commission encourages it by suggesting that the odd-lot NBBO is a 'standard benchmark' that could be used by investors 'to measure the amount of price improvement they receive for the execution of their orders.'"[1629] The commenters continued: "The odd-lot NBBO is not a standard benchmark, since the size associated with these quotes will vary greatly as opposed to the actual NBBO, which always represents a round-lot." [1630] Similarly, some commenters stated that the BOLO will not provide a useful benchmark and may instead distort price improvement statistics.[1631]

The Commission acknowledges that the BOLO is not, at present, a widely used and standard benchmark. This is likely because the requisite data is not broadly distributed and is only available to market participants who have proprietary data feeds. In contrast, the NBBO is broadly distributed in NMS data and is also more widely used as a benchmark. The Commission

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1628 17 CFR 242.610(d)(1).

1629 See Citadel Letter I at 26-27, and SIFMA Letter II at 43-44.

1630 Id.

1631 See JPMorgan Letter at 7, FIA PTG Letter II at 5, and ASA Letter at 6.

believes that including the BOLO in NMS data will similarly allow market participants to more easily use the BOLO as a benchmark if they choose to.[1632]

The Commission also recognizes that an odd-lot price that is better than the NBBO may not reflect sufficient quantity to execute certain orders, particularly larger-sized orders, and, as a result, price improvement relative to the BOLO will be more relevant in some cases than for others. However, market participants are already well versed in interpreting nuanced benchmarks—for example, holding the round lot size constant, the NBBO may reflect a different amount of dollar liquidity based on the price of the stock. Furthermore, the size available at the NBBO of any particular stock might be a great deal more than a single round lot. This means that market participants already deal with the distinction between the price of a benchmark and the amount of shares available at that benchmark price. Indeed, while one commenter points out the challenge of comparing a 500-share order to a 10-share odd-lot,[1633] a similar challenge already exists in comparing a 1000-share order to a 100-share round lot. This challenge is understood and handled already; market participants already know that quantity must be taken into account when making comparisons. The Commission expects that market participants who will benchmark their trades with the BOLO will generally have comparable levels of sophistication as investors who currently use the NBBO benchmark; given that users of the NBBO benchmark are already adept at accounting for order size, these users should not be confused by the BOLO. It is important that market participants have access to a variety of benchmarks to meet their

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1632 See infra section VII.D.6.a.ii discussing how the BOLO will make it easier for market centers and broker-dealers to compute statistics on price improvement relative to the best available displayed price, now required by amended Rule 605.

1633 See Citadel Letter I at 27.

various purposes, and the BOLO will provide a useful data point for market participants to consider in addition to the NBBO.

5. Compliance Costs

Various market participants will incur one-time implementation costs as well as ongoing compliance costs to comply with the Rule. These costs and their computations are discussed in greater detail below, but are summarized in Table 15. Some of the costs are associated with the acceleration of aspects of the MDI Rules and will only represent new costs (which are not already anticipated under the MDI rules) if the exclusive SIPs do not become competing consolidators once the MDI rules are fully implemented.

Table 15: Compliance Cost Estimates

Rule	Affected entities	One-time costs	Ongoing Costs	# of entities	Total one-time costs	Total ongoing costs
612	All trading venues[a]	$156,000		277	$43,212,000	
612	Listing exchanges[b]	$33,000	$9,000	5	$165,000	$45,000
612	SIPs[c]	$13,000	$9,000	2	$26,000	$18,000
612	Broker-dealers with order entry systems[d]	$33,000		1,161	$38,313,000	
612	Broker-dealers with smart order routers[e]	$11,000		270	$2,970,000	
610	Exchanges[f]	$57,000		15	$855,000	
600,603	Exchanges[g]	$3,500	$6,500	16	$56,000	$104,000
600,603, 612	SIPs[h]	$613,000	$174,000	2	$1,226,000	$348,000
	Total				$86,823,000	$515,000

Sources: Across estimates below, salaries are derived from SIFMA's Management & Professional Earnings in the Securities Industry 2013, modified to account for an 1,800-hour work-year and inflation, and multiplied by 5.35 to account for bonuses, firm size, employee benefits and overhead. The burden hours estimates are based on Commission's experiences with burden estimates.

[a] See Proposing Release, supra note **Error! Bookmark not defined.**, at 80333. The Proposing Release's estimate of $140,000 is adjusted to $156,000 to account for a11.4% increase in the Producer Price Index for Data Processing, Hosting and Related Services from December 2014, when the $140,000 estimate was first made. See

U.S. Bureau of Labor Statistics, Producer Price Index by Industry: Data Processing, Hosting and Related Services: Hosting, Active Server Pages (ASP), and Other Information Technology (IT) Infrastructure Provisioning Services [PCU5182105182105], retrieved from FRED, Federal Reserve Bank of St. Louis; available at https://fred.stlouisfed.org/series/PCU5182105182105 (Mar. 11, 2024).

[b] The $33,000 estimate per listing exchange is based on the following calculations: $19,950 (hourly rate for Sr. Programmer at $399 for 50 hours) + $6,860 (hourly rate for Sr. Systems Analyst at $343 for 20 hours) + $3,730 (hourly rate for Compliance Manager at $373 for 10 hours) + $2,940 (hourly rate for Director of Compliance at $588 for 5 hour) ≈ $33,000, for a total annual monetized burden of $165,000 (i.e., $165,000 = $33,000 x 5 listing exchanges). The $9,000 estimate per listing exchange is based on the following calculations: ($2,640 (hourly rate for Compliance Attorney at $440 for 6 hours) + $746 (hourly rate for Compliance Manager at $373 for 2 hours)) x 4 tick size revisions per year) ≈ $9,000, for a total annual monetized burden of $45,000 (i.e., $45,000 = $9,000 x 5 listing exchanges).

[c] The $13,000 estimate per listing exchange is based on the following calculations: $4,788 (hourly rate for Sr. Programmer at $399 for 12 hours) + $1,715 (hourly rate for Sr. Systems Analyst at $343 for 5 hours) + $3,730 (hourly rate for Compliance Manager at $373 for 10 hours) + $2,940 (hourly rate for Director of Compliance at $588 for 5 hour) ≈ $13,000. The $9,000 estimate per listing exchange is based on the following calculations: ($2,640 (hourly rate for Compliance Attorney at $440 for 6 hours) + $746 (hourly rate for Compliance Manager at $373 for 2 hours)) x 4 tick size revisions per year) ≈ $9,000.

[d] The $11,000 estimate per system change is based on the following calculations: ($2,005 (hourly rate for Attorney at $401 for 5 hours) + $2,980 (hourly rate for Compliance Manager at $298 for 10 hours) + $4,640 (hourly rate for Programmer Analyst at $232 for 20 hours) + $1,325 (hourly rate for Senior Business Analyst at $265 for 5 hours) ≈ $11,000. The Commission expects that broker-dealers are likely to have to undertake 3 system changes, for a total one-time expense of $33,000. See also Transaction Fee Pilot Adopting Release, infra note1657, at 5271 n.770.

[e] The $11,000 estimate per broker-dealers with smart order routers is based on the following Manager at $298 for 10 hours) + $4,640 (hourly rate for Programmer Analyst at $232 for 20 hours) + $1,325 (hourly rate for Senior Business Analyst at $265 for 5 hours) ≈ $11,000. See also Transaction Fee Pilot Adopting Release, infra note 1657, at 5274 n.796 where the cost to broker-dealers to update systems for the TSP was estimated to be $9,000. Here, we are allowing for an additional 10 hours of Programmer Analyst time.

[f] See Proposing Release, supra note **Error! Bookmark not defined.**, at 80333.

[g] The additional $3,500 in one-time costs and $6,500 in ongoing costs represent a 5% addition over the costs reported in the MDI release. See supra note **Error! Bookmark not defined.**, section V.C.2(d)(ii) to account for the new requirement to send the necessary data to generate odd-lot information to the exclusive SIPs.

[h] The $613,000 estimate in one-time costs is based on the following calculations: $33,000 (costs under the amendments to Rule 612 to update data specifications and internally and externally test the updates) + $167,670 ($83,790 (hourly rate for Sr. Programmer at $399 for 210 hours) + $61,740 (hourly rate for Sr. Systems Analyst at $343 for 180 hours) + $7,460 (hourly rate for Compliance Manager at $373 for 20 hours) + $5,880 (hourly rate for Director of Compliance at $588 for 10 hours) + $8,800 (hourly rate for Compliance Attorney at $440 for 20 hours) + $412,500 (costs for external services). The $174,000 estimate in ongoing costs is based on the following calculations: $50,301 ($25,137 (hourly rate for Sr. Programmer at $399 for 63 hours) + $18,522 (hourly rate for Sr. Systems Analyst at $343 for 54 hours) + $2,238 (hourly rate for Compliance Manager at $373 for 6 hours) + $1,764 (hourly rate for Director of Compliance at $588 for 3 hours) + $2,640 (hourly rate for Compliance Attorney at $440 for 6 hours)) + $123,725 (costs for external services). See infra notes 1830, 1832, 1834, and 1835 and accompanying text for relevant details on these cost estimates.

a. Estimates for Rule 612

Each trading venue will have to update systems to comply with the change in tick size for some NMS stocks under the Rule 612 amendments. Due to similarities with the changes that were required by the TSP, the Commission estimated, in the Proposing Release, that the

amendments to Rule 612 would impose the same costs to trading venues as those estimated for the TSP.[1634] These costs were estimated at $140,000 in 2014 at the time of the TSP.[1635]

Some commenters stated that the $140,000 estimated cost to trading venues in the proposal was too low because exchanges would have to acquire additional hardware and update various systems.[1636] These commenters did not provide alternative estimates for the implementation costs. As discussed in the Proposing Release, this $140,000 estimate is derived from exchange feedback on the costs associated with the TSP.[1637] This estimate acknowledges that the market participants may have hardware and system costs associated with the amendments. Given that those hardware and system changes are similar in nature to those associated with the TSP, and the commenters did not provide analysis to the contrary, the Commission continues to believe that this estimate is reasonable. One commenter suggested that the costs of processing and disseminating trading information may increase linearly with any increases in message traffic.[1638] However, estimating the costs in this manner is not possible as the Commission does not know the current costs incurred by exchanges in processing and disseminating trading information, is unaware of data sources that could provide reliable estimates, and commenters did not provide such information. As discussed in section VII.D.1.c, the Commission acknowledges that message traffic may increase due to the amendments to Rule

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1634 See Proposing Release, supra note 11, at 80333.

1635 An exchange commenting on the Tick Size Pilot estimated $140,000 as its expected expense to comply with the Tick Size Pilot's requirement to change the tick size for some stocks. See James G. Ongena, Chicago Stock Exchange (CHX), Comment Letter Re: File No. 4-657; Notice of Filing of the Proposed National Market System Plan to Implement a Tick Size Pilot Program On a One-Year Pilot Basis (Dec. 2014), available at https://www.sec.gov/comments/4-657/4657-67.pdf.

1636 See FIF Letter at 9-10 and FISD Letter at 3.

1637 See Proposing Release, supra note 11, at 80333 n.618 and surrounding text.

1638 See FIF Letter at 9 ("Some FIF members would estimate that the increased server, bandwidth and other costs would be roughly proportional to the increase in message traffic").

612, and so the costs of processing and disseminating message traffic may similarly increase. There is, however, uncertainty as to whether exchanges will need to incur additional hardware investments, and the degree of such investments, if they are needed, will likely differ from exchange to exchange, as it would depend on the capacity of their existing infrastructure to handle increased data.

To account for likely increases in the costs of computer hardware since 2014, the Commission is revising the estimated costs from $140,000 to $156,000 per trading venue.[1639] As shown in Table 15, the Commission estimates that the compliance costs associated with the amendments of Rule 612 across all trading venues are $43 million. This estimate is computed by multiplying an estimated $156,000 in one-time costs incurred by each trading venue to update systems to comply with the amendments to Rule 612, by the estimated number of trading venues, which is 277 trading venues. [1640]

Under the amendments to Rule 612, listing exchanges will have to calculate NMS stocks' time-weighted average quoted spreads and transmit their associated tick size to the exclusive SIPs. The Commission does not believe the reduction in the number of tick sizes relative to the proposal will significantly affect compliance costs since the TWAQS still needs to be calculated

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1639 The Commission has updated the expected costs to $156,000 from $140,000 to reflect the roughly 11.4% increase in the Producer Price Index for Data Processing, Hosting and Related Services from December 2014, when the $140,000 estimate was first made. See U.S. Bureau of Labor Statistics, Producer Price Index by Industry: Data Processing, Hosting and Related Services: Hosting, Active Server Pages (ASP), and Other Information Technology (IT) Infrastructure Provisioning Services [PCU5182105182105] (Mar 11, 2024, retrieved from FRED, Federal Reserve Bank of St. Louis, available at https://fred.stlouisfed.org/series/PCU5182105182105.

1640 The technical aspect of a broker-dealer that internalizes customer orders updating its system to reflect the tiered tick regime is likely similar to that of an exchange or an ATS. Thus, the Commission is applying the same cost estimate for wholesalers and other broker-dealers that execute customer orders to update their systems as that applied to exchanges and ATSs. In Q1 2023 there were 16 registered exchanges, 33 ATSs, and 228 other FINRA members (including wholesalers) that executed orders off-exchange. In the first quarter of 2023, there were 277 total entities affected. See Rule 605 Amendments, supra note 10, at 26542.

for each stock and assigning a stock to a tick size is not computationally or conceptually difficult once the TWAQS has been computed. Thus, the Commission is keeping the estimate for listing exchanges the same at $33,000 per listing exchange [1641]

Commenters stated that modifications to the data specifications with regards to transferring the tick size information from the listing exchanges to the SIPs would require both internal and external testing by the primary listing exchange and the SIPs.[1642] Commenters stated that modifications to data specifications require software changes and require testing.[1643] The Commission anticipates that the SIPs will not have to acquire additional hardware or develop new systems in order to incorporate the minimum pricing increment indicator; they will rather need to update existing specifications. The Commission expects that the amendments to Rule 612 will require a one-time cost for updating existing systems and will not increase the cost of becoming a competing consolidator once the MDI Rules are implemented, because the amendments are not expected to increase the cost of establishing new systems. Accordingly, the

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1641 The $33,000 estimate per listing exchange is based on the following calculations: $19,950 (hourly rate for Sr. Programmer at $399 for 50 hours) + $6,860 (hourly rate for Sr. Systems Analyst at $343 for 20 hours) + $3,730 (hourly rate for Compliance Manager at $373 for 10 hours) + $2,940 (hourly rate for Director of Compliance at $588 for 5 hour) ≈ $33,000. Salaries for estimates in this section are derived from SIFMA's Management & Professional Earnings in the Securities Industry 2013, modified to account for an 1,800-hour work-year and inflation, and multiplied by 5.35 to account for bonuses, firm size, employee benefits and overhead.

1642 See generally CTA-UTP Operating Committee Letter and FIF Letter.

1643 Id.

Commission estimates a one-time cost of $13,000[1644] and ongoing costs of $9,000 per year[1645] for the two SIPs.

These estimates are based on the Commission's understanding that the listing exchanges currently have access to the data needed to calculate the time-weighted average quoted spreads because such data, specifically the NBBO, are needed for the exchanges to compile Rule 605 reports.[1646] Thus, the Commission does not expect that the exchanges will incur additional costs associated with gathering data. Additionally, the listing exchanges have experience computing a share-weighted measure of average quoted spreads for their Rule 605 reports.[1647] The listing exchanges also already have connections to the exclusive SIPs, and once competing consolidators replace the exclusive SIPs it is the competing consolidators that will have the responsibility to connect to the exchanges in order to receive data. Thus, under the MDI Rules

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1644 The $13,000 estimate per listing exchange is based on the following calculations: $4,788 (hourly rate for Sr. Programmer at $399 for 12 hours) + $1,715 (hourly rate for Sr. Systems Analyst at $343 for 5 hours) + $3,730 (hourly rate for Compliance Manager at $373 for 10 hours) + $2,940 (hourly rate for Director of Compliance at $588 for 5 hour) ≈ $13,000. Salaries for estimates in this section are derived from SIFMA's Management & Professional Earnings in the Securities Industry 2013, modified to account for an 1,800-hour work-year and inflation, and multiplied by 5.35 to account for bonuses, firm size, employee benefits and overhead.

1645 The $9,000 estimate per listing exchange is based on the following calculations: ($2,640 (hourly rate for Compliance Attorney at $440 for 6 hours) + $746 (hourly rate for Compliance Manager at $373 for 2 hours)) x 4 tick size revisions per year) ≈ $9,000.

1646 See, e.g., 17 CFR 242.605(a)(ii)(E), requiring the reporting of the number of shares executed with price improvement, and 17 CFR 600(b)(36) defining "executed with price improvement" to mean, for buy orders, execution at a price lower than the national best offer at the time of order receipt and, for sell orders, execution at a price higher than the national best bid at the time of order receipt.

1647 See, e.g., 17 CFR 242.605(a)(ii)(A), requiring the reporting of the average quoted spread for executions of covered orders, and 17 CFR 600(b)(12), defining the average quoted spread as the share-weighted average of the difference between the national best offer and the national best bid at the time of order receipt or, for order executions of midpoint-or-better limit orders, the difference between the national best offer and the national best bid at the time such orders first become executable. Additionally, some listing exchanges have issued white papers that include statistics based on time-weighted average quoted spreads. See, e.g., Nasdaq Intelligent Tick, supra note 150, Chart 3 and Cboe Proposal, supra note 150, Exhibit 1.

the exchanges will not incur additional costs to connect to the competing consolidators.[1648] Additionally, the SIPs have experience distributing regulatory data and so the costs represent those of adding the tick size to existing data. Consequently, the Commission expects that having the listing exchange compute time-weighted average quoted spreads and transmit the associated tick to the exclusive SIPs currently, or to the competing consolidators once the exclusive SIPs are discontinued, will require listing exchanges to modify existing systems, rather than build or acquire new systems or hardware.

The Commission expects that broker-dealers with order entry systems will need to modify their existing systems to comply with the tick size changes and will not need to acquire new hardware or develop new systems for this specific aspect of the adopted rule. In the Proposing Release, the Commission had estimated the cost of a broker-dealer system change at $11,000.[1649] One commenter stated that for most firms a significant technological build will not be needed,[1650] other commenters stated that broker-dealers would have to undertake significant systems work, or acquire additional hardware, as a result of the amendments to Rule 612, specifically if there is a significant increase in message traffic.[1651] The message traffic implications and costs are discussed in section VII.D.1.c. This section deals specifically with modifications to broker-dealer order entry systems.

One commenter stated that the $11,000 estimate was too low because the proposed amendments to Rule 612 would necessitate additional expenses in order to update "their order

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1648 See MDI Adopting Release, supra note 10, at 18612 n.1133 and surrounding text. The costs for the competing consolidators to connect to the exchanges is accounted for in the MDI Rules and thus would not represent costs associated with this proposal.

1649 See Proposing Release, supra note 11, at 80332-34.

1650 See Apex Letter at 15.

1651 See FIF Letter at 9, TradeStation Letter at 6, Citigroup Letter at 2, and FISD Letter at 3.

management, execution management, customer trading, middle-office trade processing, reporting, settlement, surveillance and compliance systems."[1652] In the Proposing Release, when the Commission estimated the cost of a broker-dealer system change at $11,000, it assumed that a single system change would be needed in response to the Rule 612 amendments.[1653] In light of the various functions described by the commenter which would need to be updated, the Commission is revising the estimated one-time cost to broker-dealers to $33,000 per broker-dealer with an order-entry system as reported in Table 15.[1654] The revised estimate stems from the expectation that broker-dealers are more likely to have to undertake three system changes, rather than one,[1655] although the Commission recognizes that these costs could be greater if additional hardware investment is needed.

The Commission estimates that there are 1,161 broker-dealers with order entry systems.[1656] Thus, the Commission estimates that the amendments will lead to a one-time aggregate cost of around $38.5 million (i.e., $38.5 million ≈ $33,000 x 1,161) across broker-dealers with order entry systems to update their systems to account for the new tick sizes.

The Commission expects that broker-dealers with smart order routers will also need to modify their existing systems to comply with the tick size changes and will not need to acquire new hardware or develop new systems. The Commission estimates a one-time cost of $11,000 to

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1652 See FIF Letter at 9.

1653 See Proposing Release, supra note 11, at 80332.

1654 See Table 15 note d.

1655 The Commission believes that the order management, execution management, and customer trading functions highlighted by the commenter are sufficiently similar to be covered under a single system change. The middle-office trade processing, reporting, and settlement functions constitute another system change. Surveillance and compliance systems constitute a third system change.

1656 Using CAT data from December 2023, the Commission calculated the total number of unique Central Registration Depository Numeric Identifiers "CRDs" that originated an order to estimate the number of entities with an order entry system.

broker-dealers operating smart order routers.[1657] These broker-dealers already have systems that can adjust for tick sizes that change around the $1.00 threshold. Thus, the Commission expects that they will modify existing systems rather than build new systems. Any broker-dealer that will need to build new systems will likely incur costs greater than $11,000 to do so. One commenter stated that significant system changes and hardware costs would also be required by broker-dealers operating smart order routers due to an increase in message traffic.[1658] The Commission acknowledges that the one-time costs to broker-dealers operating smart order routers may be greater than estimated if additional hardware investment will be required.[1659]

The Commission estimates an upper bound of 270 broker-dealers operating smart order routers.[1660] This number provides an upper bound as it assumes that all entities with direct connections to exchanges or ATSs use a smart order router, which is likely an over-estimate. Aside from potential additional costs due to increased message traffic, the Commission thus estimates a one-time cost of $3.0 million (i.e., $3.0 million ≈ $11,000 x 270) for market participants to update smart order routers.[1661] If fewer than 270 broker-dealers operate their own

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1657 The $11,000 estimate per broker-dealers with smart order routers is based on the following Manager at $298 for 10 hours) + $4,640 (hourly rate for Programmer Analyst at $232 for 20 hours) + $1,325 (hourly rate for Senior Business Analyst at $265 for 5 hours) ≈ $11,000. See also Securities Exchange Act Release No. 84875 (Dec 19, 2018), 84 FR 5202 (Feb 20, 2019) ("Transaction Fee Pilot Adopting Release") at 5274 n.796 where the cost to broker-dealers to update systems for the TSP was estimated to be $9,000. Here, we are allowing for an additional 10 hours of Programmer Analyst time.

1658 See FIF Letter at 9.

1659 See supra section VII.D.1.c for additional discussion about costs to market participants stemming from increases in message traffic.

1660 This number is estimated by counting the number of unique CRDs that submitted an order directly to an exchange or ATS in the month of December 2023.

1661 The Commission also expects there may be other costs associated with updating systems to account for an increase in message traffic resulting from the new tick sizes. See supra section VII.D.1.c for additional discussion.

smart order routers, then the $3.0 million estimate is likely higher than the aggregate cost for these broker-dealers to adjust their order routing systems to comply with these amendments.

Further, the Commission believes that broker-dealers operating smart order routers already subscribe to SIP data and will subscribe to consolidated market data products once the competing consolidators become operative. Thus, they will not incur a separate data expense to receive the regulatory messages necessary to comply with Rule 612 amendments. The Commission also assumes that system updates will impose a similar cost on larger and smaller entities given that, once code is written, scaling it up is relatively inexpensive.

Lastly, the Commission recognizes that Rule 612 amendments could increase the overall implementation costs of the MDI Rules. In particular, stocks that will become less tick-constrained as a result of the smaller tick size following these amendments could have more odd-lot quotes inside the NBBO than anticipated when the Commission adopted the MDI Rules.[1662] As a result, the costs to SROs and competing consolidators of collecting, transmitting, consolidating, and disseminating odd-lot information will be greater than those described in the MDI Rules. The Commission is unable to provide an estimate of this cost because it would require predicting a complex interaction between behavior changes from multiple types of market participants and the resulting effect on the number of ticks inside the NBBO and the volume of odd-lots submitted inside the NBBO. However, the cost increase may not be significant, because the Commission generally estimates that the infrastructure cost increases associated with an increase in message traffic from the amendments to be approximately 1%.[1663]

[1662] This is a result of a smaller tick size allowing liquidity to spread over more levels, reducing the depth at each level and could increase the number of odd-lot quotes at each level. See supra section VII.D.1.b for additional discussion.

[1663] See supra note 1334 and accompanying text.

Multiple commenters stated that many broker-dealers, particularly those with retail customers, would have to incur additional costs for investor education and customer assistance in order to handle any investor confusion arising from the amendments to Rule 612.[1664] One commenter specifically mentioned that the amendments to Rule 612 would complicate "good-til-cancelled" orders ("GTC orders") as the orders could be placed under one tick size and could still be active after a tick size change.[1665] This scenario is unlikely given that there will be a period of one-month between end of the evaluation period and the tick size implementation during which market participants will be able to know which stocks will be changing their tick size. For an issue to arise, the GTC order would have to be in place over the course of that month and the trader would have to be unaware of the upcoming tick size change. Retail facing broker-dealers will likely implement some method of notifying their customers that the tick size for some stocks will change following the end of the evaluation period. To the extent to which customer confusion causes these costs to materialize, the Commission would expect that these costs would likely be greater in the time immediately following the implementation of the amendments, and they would decrease over time as investors become accustomed to the new tick size regime.

b. Estimates for Rule 610

As in the Proposing Release, the Commission estimates a $57,000 one-time cost to exchanges to comply with changes to Rule 610.[1666] This estimate assumes that exchanges will combine in the same Rule 19b-4 filing their proposals to amend their fees and rebates and make

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1664 See, e.g., FISD Letter at 2, TastyTrade Letter at 19, and TradeStation Letter at 6.

1665 See TradeStation Letter at 6.

1666 See Proposing Release, supra note 11, at 80333.

fees and rebates determinable at the time of execution, and that this process will not increase the cost of those filings. The Commission recognizes that if these filings are not efficiently combined, then the costs to exchanges could be higher than $57,000. The Commission estimates also assume that LTSE will not file a proposed rule change with the Commission because it does not currently charge access fees or offer rebates, but that the other 15 exchanges will file proposed rule changes. If so, these amendments will lead to an estimated one-time total cost of $855,000 across exchanges to comply with Rule 610.[1667]

c. Estimates for Rules 600 and 603

The exclusive SIPs and exchanges will incur compliance costs associated with accelerating the inclusion of odd-lot data inside the NBBO in SIP data, adding the BOLO to SIP data, and accelerating the implementation of the round lot definitions as amended in this release. The round lot definitions (but for amendments to them in this release) and the inclusion of odd-lot data inside the NBBO were both parts of the MDI Rules. Thus, the amendments will accelerate the compliance costs associated with these aspects of the MDI Rules. One difference is that the MDI Rules anticipated that these changes to NMS data would occur after the competing consolidator model was up and running. Thus, the MDI Rules did not anticipate that the exclusive SIPs would incur such costs unless they chose to become competing consolidators. The addition of the best odd-lot order to the SIP data was not part of the MDI Rules and will thus be a new cost under the amendments. Accordingly, the discussion below distinguishes costs to

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[1667] The Commission does not expect other market participants to incur significant incremental costs associated with the change in the access fees and rebates. As shown in Table 4, market participants deal with over 100 fee changes per year across all exchanges and thus it reasonable to expect that one fee change by the exchanges to bring their fees into compliance with these amendments would represent an economically trivial incremental cost to these market participants.

the exclusive SIPs in terms of those included in the MDI Rules and new costs from these amendments.

The Commission estimates a one-time cost of $3,500 and ongoing costs of $6,500 per year for at least two years for exchanges to comply with the amendments to Rules 603 and 600.[1668] This estimate accounts for the acceleration of the necessary data to generate the odd-lot information, including the best odd-lot order, and transmit this information to the exclusive SIPs. The costs reported here account for an increase in the costs associated with the MDI Rules that will require the exchanges to transmit to competing consolidators all of the data necessary for generating consolidated market data.

Consequently, for the exchanges, the costs associated with providing the exclusive SIPs with odd-lot information will represent an acceleration of costs anticipated in the MDI Rules rather than new costs, with a few differences. First, the odd-lot information will be transmitted to the exclusive SIPs as opposed to the competing consolidators. Second, the ongoing costs of these amendments will be incurred only until the exclusive SIPs are retired, which the Commission estimates will be at least two years after the Commission's approval of the plan amendment(s) required by Rule 614(e).

Compliance with the amendments to Rules 603 and 600 will require the exclusive SIPs to develop, operate, and maintain systems to collect and disseminate the odd-lot information inside the NBBO as well as the best odd-lot order. The Commission expects that these costs will

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[1668] In the MDI Adopting Release, supra note 10, at 18764, the Commission estimated costs to the exchanges of collecting and transmitting the necessary information to the competing consolidators to be approximately $70,000 in one-time costs and approximately $130,000 in ongoing costs. The additional $3,500 in one-time costs and $6,500 in ongoing costs represent a 5% addition over the costs in the MDI release to account for the new requirement to send the necessary data to generate odd-lot information to the exclusive SIPs (i.e., $3,500 ≈ $70,000 x 0.05 and $6,500 ≈ $130,000 × 0.05). See infra note 1841 and accompanying text.

primarily consist of costs that an exclusive SIP would incur if it were to convert to a competing consolidator. Thus, for exclusive SIPs that would have become competing consolidators in the absence of these amendments, initial compliance costs represent an acceleration of costs under the MDI Rules, rather than new additional costs. Further, the ongoing costs for exclusive SIPs to comply with Rules 600 and 603 will be incurred only until the exclusive SIPs are retired, after which time these costs will consist of ongoing costs that were previously accounted for in the MDI Rules. The Commission estimates that the exclusive SIPs will incur a one-time cost of approximatively $613,000 and ongoing costs of approximatively $174,000 per year.[1669]

The Commission recognizes some uncertainty in the assumption that exclusive SIPs will become competing consolidators. If one or both exclusive SIPs are not planning to become competing consolidators under the MDI Rules, and the amendments do not change their plans, then the estimated initial and ongoing costs in Table 15 represent new costs associated with the amendments. If the amendments were to prompt one or both exclusive SIPs to become competing consolidators, when they otherwise would not have done so, then the costs in Table 15 underestimate the total costs of these SIPs becoming competing consolidators. In the MDI Rules, however, the Commission anticipated that both exchanges operating exclusive SIPs would

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[1669] The $613,000 estimate in one-time costs is based on the following calculations: $33,000 (costs under the amendments to Rule 612 to update data specifications and internally and externally test the updates; see supra note 1651, see also section VII.D.5.a) + $167,670 ($83,790 (hourly rate for Sr. Programmer at $399 for 210 hours) + $61,740 (hourly rate for Sr. Systems Analyst at $343 for 180 hours) + $7,460 (hourly rate for Compliance Manager at $373 for 20 hours) + $5,880 (hourly rate for Director of Compliance at $588 for 10 hours) + $8,800 (hourly rate for Compliance Attorney at $440 for 20 hours) + $412,500 (costs for external services). The $174,000 estimate in ongoing costs is based on the following calculations: $50,301 ($25,137 (hourly rate for Sr. Programmer at $399 for 63 hours) + $18,522 (hourly rate for Sr. Systems Analyst at $343 for 54 hours) + $2,238 (hourly rate for Compliance Manager at $373 for 6 hours) + $1,764 (hourly rate for Director of Compliance at $588 for 3 hours) + $2,640 (hourly rate for Compliance Attorney at $440 for 6 hours)) + $123,725 (costs for external services). See infra notes 1830, 1832, 1834 and 1835 and accompanying text for relevant details on these cost estimates.

have strong incentives to enter the competing consolidator market.[1670] The amendments require that the exclusive SIPs build out the capacity to disseminate aspects of the data required by the MDI Rules. This could increase the likelihood that the exclusive SIPs will choose to become competing consolidators because they will already have implemented some of the technology needed to comply with the requirements of a competing consolidator, thereby lowering their subsequent cost of becoming a competing consolidator. In this context, the Commission continues to expect that the exclusive SIPs will become competing consolidators, and the estimated costs in Table 15 largely represent costs that the exclusive SIPs would have borne in the process of becoming competing consolidators.

The Commission recognizes that the amendment to Rule 600 could increase the initial costs of becoming a competing consolidator as well as the ongoing costs of competing consolidators, but the Commission believes that such costs are already accounted for in the MDI Rules.[1671] In particular, competing consolidators could incur additional compliance costs to estimate and disseminate the best odd-lot order. To the extent such costs are not accounted for in the MDI Rules, they will likely be a small fraction of the compliance costs of including odd-lot information in SIP data stated above. Indeed, the competing consolidators will already have the information necessary to calculate the BOLO, so most of the cost incurred under the amendment to Rule 600 will be the initial cost of coding the information and the cost of processing and monitoring that code in real time.

1670 See MDI Adopting Release, supra note 10, at 18761.

1671 See supra section VII.D.5 for further discussion of how or whether this requirement would alter the compliance costs of competing consolidators.

6. Interactions with Recently Adopted Rules

The Commission acknowledges that the effects of any final rule may be impacted by recently adopted rules that precede it. Accordingly, each economic analysis in each adopting release considers an updated economic baseline that incorporates any new regulatory requirements, including compliance costs, at the time of each adoption, and considers the incremental new benefits and incremental new costs over those already resulting from the preceding rules. We discuss below economic effects stemming from interactions between the final rule and other recently adopted rules.[1672]

a. Amendments to Rule 605

Commenters have specifically questioned the Commission's analysis of interactions between the four EMS Proposals,[1673] of which only the Rule 605 Proposal has been adopted.[1674] Because the amendments to Rule 605 were not yet adopted at the time of the Proposing Release and were thus not a part of the baseline in the Proposing Release,[1675] the economic effects described in the Proposing Release may differ from those described here to the extent those effects change due to the amendments to Rule 605. Below, we discuss specific impacts the amendments to Rule 605, which is now part of the baseline, may have on the expected economic effects of the final rules compared to description of those effects in the Proposing Release, as well as the impact the final rules may have on the effects of amended Rule 605. In response to comments, we also consider whether the amended Rule 605 data is needed to assess the impact

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1672 As explained above, the Commission considers recently adopted rules, but not recent proposals, as part of its baseline against which it measures the economic effects of its rules. See supra section VII.C and notes 1034 and 1047.

1673 See supra section II for further discussion.

1674 See Rule 605 Amendments, supra note 10.

1675 See supra note 1672.

of the final rules. Overall, the inclusion of the amendments to Rule 605 in the baseline does not significantly change the costs and benefits of the final rules, and the final rules adopted herein have significant benefits even taking into account the adopted amendments to Rule 605 as part of the baseline.

i. Impact of Amended Rule 605 on the Final Rules

First, the Commission considers whether the amendments to Rule 605, which are now part of the baseline, may have affected certain benefits of the final rules compared to how those benefits were described in the Proposing Release. Some commenters stated that the four EMS Proposals, including the amendments to Rule 605 and these final rules, have similar objectives, such that the benefits of each rule may be overlapping, and that therefore each successive rule would have fewer benefits than were described in each proposing release.[1676] However, the final rules address different and significant issues in the national market system distinct from those addressed in Rule 605.[1677] The final rules have benefits, such as certain improvements in market quality for stocks that receive a smaller tick size, lower trading costs for liquidity demanders in certain stocks that experience a reduction in their access fees, and increased transparency and reduced complexity of exchange access fees and rebates, that are distinct from the benefits

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1676 See, e.g., Virtu Letter II at 55-56 (stating "that the proposals are designed to accomplish the same overarching goals," that "each rule ignores the possibility that the other three rules may already address the Commission's concerns," that "the expected benefit the Commission believes its rules will achieve is overlapping," and that an important policymaking question that arises from these overlapping objectives is whether "the estimated benefits [are] purely additive") see also SIFMA Letter II at 100 (stating that "the Proposed Rules may, each individually, largely affect the same aspects of equity markets, including the economics of liquidity provision, spreads (particularly for retail investors), and costs (particularly for wholesalers)"); Virtu Letter II at 20 (stating that, if any of the other rules (including Rule 605) are successful at achieving their stated purpose, "competition would be enhanced without the Proposed [Tick Size] Rule (and its significant risks and costs) and the claimed benefits of the Proposed Rule are overstated"); Virtu Letter III at 2 (stating that the amendments in the Rule 605 Amendments may "otherwise address any concerns that formed the impetus for the [EMS] Proposals," including the Proposing Release).

1677 See supra section II for further discussion.

resulting from the amendments to Rule 605 and could not conceivably have been achieved through the amendments to Rule 605.[1678] While, as one commenter stated,[1679] both rules may improve competition, the issues being addressed in these final rules and in the amendments to Rule 605, and the mechanisms used to address them, differ significantly, making these benefits additive rather than overlapping. For example, the amendments to Rule 605 will increase competition among trading venues through greater transparency,[1680] while these final rules will increase competition between orders on trading venues in some stocks by removing barriers to subpenny quoting. Both of these competitive effects are expected to improve execution quality, but through different mechanisms and independently of one another.

In addition, the adoption of the amendments to Rule 605 may, to some extent, enhance certain benefits of the final rules compared to the benefits described in the Proposing Release. Specifically, the final rules are expected to increase the extent to which broker-dealers make decisions based on execution quality.[1681] At the same time, the amendments to Rule 605 improve broker-dealers' access to information about the execution quality of market centers.[1682] Thus, to the extent that broker-dealers base their order routing decisions more on execution quality as a

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1678 See supra sections VII.D.1.b, VII.D.2, and VII.D.3 for further discussion of the benefits of the final rules and supra section VII.C.5 for a discussion of the benefits resulting from the amendments to Rule 605.

1679 See supra note 1676.

1680 See Rule 605 Amendments, supra note 10, at 26543-75.

1681 Specifically, the increase in transparency in exchange access fees and rebates in the final rules is expected to decrease the extent to which broker-dealers' routing decisions are based on access fees and rebates and increase the extent to which these decisions are based on other factors, including the execution quality of market centers See supra section VII.D.3.

1682 For example, the amendments to Rule 605 increase the granularity of time-to-execution buckets, which will improve broker-dealers' ability to compare execution speeds across trading venues and route their orders accordingly. See Rule 605 Amendments, supra note 10, at 26561.

result of the final rules, the improved access to market center execution quality information under amended Rule 605 will help facilitate those decisions.[1683]

The adopted amendments to Rule 605 may also, in certain circumstances, cause the benefits of the final rules stemming from transparency to be somewhat lower than those described in the Proposing Release; however, the Commission expects these impacts to be minor. Specifically, in the Rule 605 Amendments, the Commission anticipated that the increase in transparency and competition on the basis of execution quality as a result of the amendments to Rule 605 might make broker-dealers less likely to route customer orders based on exchange fees and rebates.[1684] At the same time, the amendments to Rule 610 that would make fees and rebates determinable at the time of execution are expected to reduce broker-dealer conflicts of interest related to fees and rebates.[1685] Likewise, the lower access fee cap is also expected to reduce broker-dealer conflicts of interest.[1686] If the amendments to Rule 605 result in exchange fees and rebates becoming less important for broker-dealer customers' order routing decisions, the benefits resulting from a reduction in conflicts of interest under the final rules—caused by reducing the access fee cap and increasing the transparency of exchange fees and rebates—may be reduced compared to how they were described in the Proposing Release. However, this reduction in benefits, compared to the Proposing Release, is likely to be minor, for several reasons, and the Commission still expects the benefits described above, in comparison to the

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1683 See Rule 605 Amendments, supra note 10, at 26544-26547 (discussing the impact of the amendments to Rule 605 on competition between broker-dealers).

1684 See Rule 605 Amendments, supra note 10, at 26586.

1685 See supra section VII.D.3 for a discussion of the economic effects of requiring exchange fees and rebates to be determinable at the time of execution.

1686 See supra section VII.D.2 for a discussion of the economics effects of reducing the access fee cap on conflicts of interest.

baseline, to be realized. First, not all orders are subject to and directly benefit from increased transparency under amended Rule 605.[1687] Second, the amended Rule 605 reporting requirements only require reporting by larger broker-dealers; while these broker-dealers handle the vast majority of customer accounts, they only handle around 60% of customer order flow in terms of number of orders.[1688] Therefore, the amendments to Rule 605 are not expected to directly impact customer order routing decisions for a significant subset of order flow,[1689] such that the final rules lowering the access fee cap and increasing the transparency of exchange fees and rebates are still expected to have additional benefits above and beyond those of the amendments to Rule 605.

Third, the Commission anticipated that the amendments to Rule 605, by expanding the scope of covered orders to include odd-lots, would encourage broker-dealers to compete for these orders on the basis of execution quality.[1690] The final rule's requirement that the exclusive SIPs disseminate odd-lot data[1691] is expected to accelerate the benefits of accelerating the implementation of including odd-lot information in NMS data,[1692] which may include facilitating

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1687 For example, in the Rule 605 Amendments, an analysis of Tick Size Pilot data found that, between April 2016 and March 2019, approximately 25% of orders were flagged as having special handling requests, which would exclude them from the scope of Rule 605 reporting requirements. See Rule 605 Amendments, supra note 10, at 26514.

1688 The Rule 605 Amendments estimated that only 85 out of 1,245 broker-dealers with at least one customer account would qualify as a larger broker-dealer and therefore be required to prepare Rule 605 reports; however, these 85 broker-dealers are responsible for more than 98% of customer accounts and more than 60% of customer orders. See Rule 605 Amendments, supra note 10, at 26428 (Table 13).

1689 The Rule 605 Amendments acknowledge that, if smaller broker-dealers are also incentivized to produce execution quality information for their customers as a result of the expanded scope of Rule 605 to include larger broker-dealers, the benefits of increased competition could indirectly extend to smaller broker-dealers as well. See Rule 605 Amendments, section IX.C.1.(D)(1), supra note 10, at 26428.

1690 See Rule 605 Amendments, supra note 10, at 26552.

1691 See 17 CFR 242.603(b)(3) for rule text relating to this requirement under Rule 603.

1692 See supra section VII.D.4.c.

better execution quality for these orders by broker-dealers who newly have access to information about odd-lots.[1693] To the extent that the increase in competition for odd-lot execution quality under amended Rule 605 has already incentivized broker-dealers to increase their usage of existing sources of odd-lot data (such as proprietary data feeds) in routing decisions, this would reduce the number of broker-dealers without pre-existing access to odd-lot information and thus may reduce the benefits from disseminating odd-lot information in the SIP as described in the Proposing Release. However, if broker-dealers that rely on odd-lot information from proprietary data feeds are able to reduce their costs by switching to using odd-lot information from the SIP,[1694] this would result in benefits even to those broker-dealers with pre-existing access to odd-lot information.[1695]

ii. Impact of the Final Rules on Amended Rule 605

In addition to the impact amended Rule 605 may have on the effects of the final rules compared to those described in the Proposing Release, the Commission also considered the reverse, i.e., whether the final rules may impact the effects of amended Rule 605 going forward.

1693 See supra note 1151 and corresponding text. See MDI Adopting Release, supra note 10, at 18753, stating that "if a broker-dealer previously did not have access to odd-lot information, then a broker-dealer receiving the additional information may help facilitate best execution of its clients' orders."

1694 See MDI Adopting Release, supra note 10, at 18753 and 18793-95 (discussing market participants substituting MDI odd-lot information for exchange proprietary data feeds).

1695 As another example, the Rule 605 Amendments stated that one indirect effect of the amendments to Rule 605 might be an increase in incentives for reporting entities to compete in areas other than improved execution quality, including lowering their access fees. See Rule 605 Amendments, supra note 10, at 26575. This could also reduce incentives to route based on fees and rebates, which would reduce the benefits of increased transparency under the final rules. However, this would only be the case in limited circumstances, i.e., when exchanges are not able to differentiate themselves based on execution quality. Furthermore, the Rule 605 Amendments also acknowledged that Rule 605 reporting entities may pass some of the costs of amended Rule 605 on to their customers. See Rule 605 Amendments, supra note 10, at 26586. If exchanges pass on their compliance costs by raising their access fees, then the benefits of the final rules may be heightened by the adopted amendments to Rule 605, rather than lessened.

Specifically, the final rules will enhance certain benefits and reduce certain costs of amended Rule 605. As discussed above, the amendments accelerating MDI Rules related to including information about odd-lots into SIP data will accelerate the realization of the benefits of this information.[1696] In turn, the MDI Rules increase the usefulness of price improvement statistics included in amended Rule 605 using the best available displayed price as the benchmark by providing market participants with price improvement information relative to a benchmark price that more accurately reflects liquidity available in the market.[1697] Increasing the usefulness of price improvement statistics promotes incentives for reporting entities to seek out or offer price improvement relative to the best displayed price, taking into account all available displayed liquidity (including odd-lots).

In addition, the value of reporting price improvement relative to the best displayed price relative to the NBBO, now required by amended Rule 605,[1698] will increase for those stocks for which the reductions in the tick size in the final rules result in an increase in the number of price levels within the spread.[1699] If there are more price increments within the spread, it is more likely that the best displayed price will be different from the NBBO. Similarly, the availability of a greater number of price increments within the spread increases the value of the separate reporting of execution quality information for midpoint-or-better NMLOs[1700] because the prevalence of

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1696 See supra section VII.D.4.c.

1697 See 17 CFR 242.600(b)(14) (defining the "best available displayed price") and 17 CFR 242.605(a)(1)(ii)(M) – (Q); see also Rule 605 Amendments, supra note 10, section III.B.4(g) for further discussion of these amendments.

1698 See supra note 1176 and corresponding text.

1699 See supra section VII.D.1.b for further discussion.

1700 See supra note 1179 and corresponding text.

these orders is likely to increase.[1701] Furthermore, if a reduction in the tick size results in a reduction of depth at the NBBO, this increases the usefulness of the recently adopted measures of size improvement included in amended Rule 605 reports.[1702] Finally, the final rule requiring NMS data to also include information on the best priced odd-lot orders across all markets[1703] will reduce ongoing compliance costs related to compiling information about price improvement relative to the best displayed price under amended Rule 605.[1704] This is because reporting entities will be able to access standardized information about the best odd-lot order, rather than needing to use odd-lot trade and quote data to calculate the best odd-lot order themselves.[1705]

One commenter stated that because of the proposed amendments to the definition of "categorized by order size" in Rule 605,[1706] subsequent changes to the definition of tick sizes and

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1701 An analysis of CAT data in the Rule 605 Amendments found that, in the quartile of stocks with the lowest quoted spreads (an average quoted spread of around $0.026), midpoint-or-better orders still compromise a non-negligible percent of order flow, representing 5.15% of submitted orders (4.32% of submitted shares). This is compared to the quartile with the highest quoted spreads (an average quoted spread of $20.26), where midpoint-or-better orders are 9.66% of submitted orders (8.62% of submitted shares). See Rule 605 Amendments, supra note 10, at 26428 n.1448.

1702 See supra note 1182 and corresponding text.

1703 See supra section VII.D.4.d.

1704 See supra note 1178.

1705 The amendments to include in Rule 605 information about price improvement relative to the best displayed price, size improvement, and beyond-the-midpoint NMLOs (which are a subset of midpoint-or-better NMLOs) were also considered in the Rule 605 Proposal; see Rule 605 Proposal, supra note 117, at 3817, 3819, and 3810. The Commission acknowledges that, to the extent that it occurs, an increase in the cost of processing and storing consolidated market data may be higher for larger broker-dealers, who will be required to prepare Rule 605 reports for the first time under the adopted amendments to Rule 605. As a result, the additional cost of preparing Rule 605 reports may be higher for these broker-dealers as a result of the final rules. See supra section VII.D.1.c for a discussion of how the final rules may increase the cost of processing and storing consolidated market data.

1706 The final amendments to Rule 605 likewise included an amended definition of "categorized by order size" that requires orders to be categorized according to whether they are round lots. See Rule 605 Proposal, supra note 117, at 3807; proposed Rule 600(b)(19). As amended, rather than requiring the reporting of order sizes in terms of whether an order was less than one share, an odd-lot, or in one of five categories based on numbers of round lots, final Rule 605 requires the reporting of order sizes in terms of notional values, with each order size category further separated into whether an order is a round lot, odd-lot, or fractional order, for a total of 24 reporting categories. See Rule 605 Amendments, supra note 10, at section

round lots would "create customer confusion" regarding their Rule 605 reporting requirements.[1707] The Commission does not believe that market centers and brokers-dealers will be confused about their reporting obligations under amended Rule 605 as a result of the new round lot definition and the new minimum tick size under the final rules. The rule texts for both amended rules are clearly stated. Further, the use of notional value in the order size categories under the adopted amendments to Rule 605 will help end users of these reports understand the effect of a change in round lot size for a security because a notional value range will remain constant even if the size of a round lot changes.[1708]

iii. Delaying the Final Rules until Amended Rule 605 Data are Available

Third, in response to comments, the Commission considers whether adoption of the final rules should be delayed until amended Rule 605 data are available.[1709] Several commenters suggested that the Commission wait to adopt the final rules until after the amended Rule 605 data are available so that amended Rule 605 data could be used to assess whether the final rules are necessary.[1710]

III.B.1; adopted Rule 600(b)(18). Prior Rule 600(b)(13) required reporting of order sizes in one of four categories based on numbers of round lots, with no reporting of fractional orders or odd-lots.

1707 See Tastytrade Letter at 5.

1708 See Rule 605 Amendments, supra note 10, at 26428 n.375. It may be the case that, within a given notional order size bucket in Rule 605 reports, the distribution of orders across round-lot and odd-lot categories may change for some stocks following the implementation of the new round lot definition.

1709 See supra section VII.C.5 for discussion of the implementation timeline for the adopted amendments to Rule 605. See supra section VI for further discussion of the compliance dates for the final rules.

1710 See, e.g., Virtu Letter II at 24 (recommending that "the Commission amend Rule 605 to provide more comprehensive execution quality statistics on retail activity based on input from investors and market participants, and then pause to study and assess market quality based on the newly collected data before determining whether to move forward with the Proposed Rule"); Citadel Letter II at 1-2 (stating that "the data provided pursuant to an updated Rule 605 should be the primary input in determining whether the other proposals are necessary)" See also Letter from Ellen Greene, Managing Director, Equities & Options

Although the information disclosed under Rule 605 is a significant source of information about execution quality, the Commission did not rely on, and does not believe that it is necessary to rely on, Rule 605 data (either adopting or pre-existing) in its analyses in the Proposing Release or in the adoption of the final rules.[1711] Instead, the Commission utilized other data sources for conducting the relevant analyses, including with respect to execution quality, which it believes has sufficiently informed the Commission and the public on the issues being addressed in the final rule.[1712] Other commenters suggested waiting until after the amended Rule 605 data is available so that amended Rule 605 data could be used to evaluate the impact of the implementation of the final rules.[1713] The Commission acknowledges that Rule 605 data is an

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Market Structure, and Joseph Corcoran, Managing Director, Associate General Counsel, SIFMA, dated Aug. 14, 2024 at 3; SIFMA Letter II at 3; Virtu Letter II at 1-2; and comments discussed in supra note 122 and accompanying text.

1711 This was supported by a commenter, who stated that "better data from Rule 605 reports, among other sources, could be useful in making additional decisions about tick size in the future. But it is certainly not needed to decide whether to make changes to the tick size now." See IEX Letter I at 4.

1712 Data used in the Proposing Release, supra note 11, included CAT data, see, e.g., Proposing Release at 80340 n.673; MIDAS data, see, e.g., id. at 80297 Tables 1, 2; TAQ data, see, e.g., id. at 80313 Table 6; WRDS intraday indicators, see, e.g., id. at 80316 Table 8; Rule 606(a)(1) reports, see, e.g., id. at 80306 n.467; and Tick Size Pilot data and Rule 606(a)(1) reports, see, e.g., id. at 80320 Table 9. While the Proposing Release included an estimate of the number of trading venues who report Rule 605 statistics, see id. at 80333, Rule 605 data itself was not used. One commenter stated that the Proposing Release, "relies, in part, on data from Rule 605 reports—which use metrics that the Commission has acknowledged are deficient and in need of modification." The commenter proceeded to cite the Proposing Release at 80321 n.557, which discusses the horizon over which realized spreads are calculated in both the TSP analysis and in Rule 605 reports. See Virtu Letter II at 5 and n.8. The realized spread is a common and useful metric that will continue to be reported under the amendments to Rule 605. While both the TSP analysis and Rule 605 reports calculate realized spreads using a five-minute horizon, the commenter is incorrect in stating that the Proposing Release relied on data from Rule 605 reports. In the TSP analysis, the Commission calculates realized spreads using trade and quote data from TAQ; when completing Rule 605 reports, trading centers calculate realized spreads using similar trade and quote data. Rule 605 reports are therefore not necessary to obtain the realized spreads used in the TSP analysis.

1713 See, e.g., SIFMA Letter II at 3 (stating that a quantitative analysis "can only be done effectively after the implementation and operation of the proposed amendments to Rule 605 to allow the Commission and the public to measure the impact of modified tick sizes and/or access fee caps"); see also Citadel Letter I at 29 (stating that "if both proposals were to be finalized, it appears that market participants and regulators would be unable to accurately assess the true impact of the market structure changes contained in this Proposal, precluding an 'apples-to-apples' before-and-after comparison").

important source of public information about order execution quality. However, as stated by another commenter, there are other data products that provide relevant information on execution quality that can be used to evaluate the impact of the final rules.[1714] Waiting until amended Rule 605 data are available to adopt the final rules would delay the significant benefits of the final rules to be realized, and the Rule 605 Amendments cannot and do not solve the main concerns that the final rules address by reducing the tick size, lowering the access fee cap, and accelerating the round lot definition are designed to solve.

b. Implementation Costs from Overlapping Compliance Periods

Several commenters stated that the Commission should consider the cumulative costs of implementing the proposed amendments and other recent Commission rules and proposed rules.[1715] Specifically, one commenter requested that the Commission "publish a thorough analysis of the cumulative effects of the Interconnected Rules that accounts for interconnections and dependencies among them and any other rules the Commission has proposed or intends to propose in the near term," and "tak[e] into account not just the expected effects on investors and our capital markets but also practical realities such as implementation timelines as well as operational and compliance requirements."[1716] We consider here recently adopted rules, including the Settlement Cycle Adopting Release, February 2024 Form PF Adopting Release, May 2023 SEC Form PF Adopting Release, Dealer Adopting Release, Rule 605 Amendments, Beneficial Ownership Adopting Release, Rule 10c-1a Adopting Release, Short Position

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1714 See IEX Letter III at 3 ("There are myriad sources of information that both regulators and market participants draw on to consider how orders are handled and how markets compete with and compare to each other."). See also supra section II for additional discussion.

1715 See supra note 1035.

1716 ICI Letter II.

Reporting Adopting Release, Treasury Clearing Adopting Release, and Customer Notification Adopting Release.[1717]

Consistent with its long-standing practice, the Commission's economic analysis in each adopting release considers the incremental benefits and costs for the specific rule—that is the benefits and costs stemming from that rule compared to the baseline. The Commission acknowledges the possibility that complying with more than one rule may entail costs that could exceed the costs if the rules were to be complied with separately. Two of the rules identified by commenters have compliance dates that occur before the effective date of the final amendments.[1718] The compliance periods for other rules overlap in part, but the compliance dates adopted by the Commission in recent rules are generally spread out over an approximately two-year period extending to June 2026,[1719] which could limit the number of implementation activities occurring simultaneously. Where overlap in compliance periods exists, the Commission acknowledges that there may be additional costs on those entities subject to one or more other rules as well as implications of those costs, such as impacts on entities' ability to invest in other aspects of their businesses.[1720]

Affected entities subject to the amendments may be subject to one or more of the other recently adopted rules depending on whether those entities' activities fall within the scope of the other rules. Specifically, the Rule 605 Amendments, which require disclosures for order

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1717 See supra section VII.C.

1718 The compliance date for the May 2023 SEC Form PF Adopting Release occurred on December 11, 2023 and June 11, 2024, and the compliance date for the Settlement Cycle Adopting Release occurred on May 28, 2024.

1719 See supra section VII.C.

1720 See, e.g., MFA Comment Letter II (asserting that the adoption of multiple proposals would impose "unprecedented operational and other practical challenges").

executions in NMS stocks, affects market centers and certain larger broker-dealers that were not required to publish Rule 605 reports prior to the Rule 605 amendments. The Beneficial Ownership, Rule 10c-1a, Short Position Reporting, Dealer, and Customer Notification Adopting Releases also apply to certain brokers and dealers[1721]—although due to differing requirements, these rules may not all apply to any given broker or dealer. The Treasury Clearing Adopting Release applies to certain participants of the covered clearing agencies which could include broker-dealers.[1722] We acknowledge that entities subject to multiple rules may still experience increased costs associated with implementing multiple rules at once as well as implications of those costs, such as impacts on entities' ability to invest in other aspects of their businesses.

In addition, while the Commission received comments on the interaction of the MDI Rules and these amendments,[1723] commenters did not specifically address costs associated with overlapping compliance periods. When the Commission adopted the MDI Rules, it outlined a phased transition plan for implementation.[1724] Based on the times provided in the transition plan for implementation of the MDI Rules, the Commission estimated that the full implementation of the MDI Rules will be at least two years after the Commission's approval of the plan amendment(s) required by Rule 614(e).[1725] Therefore, the length of time affected market

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1721 See Beneficial Ownership Adopting Release, supra note 1029 at 76897, 76945; Rule 10c-1a Adopting Release, supra, note 1030 at 75647, 75717-18; Short Position Reporting Adopting Release, supra note 1031 at 75150; Dealer Adopting Release, supra note 1028 at 14938, 14967-71; Customer Notification Adopting Release, supra note 1034 at 47689, 47725.

1722 See Treasury Clearing Adopting Release, supra note 1045, at 2717, 2791.

1723 See, e.g., Citadel Letter I at 26; SIFMA Letter II at, e.g., 41-42; Robinhood Letter at 44.

1724 See MDI Adopting Release, supra note 10, at 18699-18701.

1725 See supra note 1139 and accompanying text.

participants will have to come into compliance with both the MDI Rules and these amendments, and the likelihood of limited overlap in compliance periods, will mitigate compliance costs.[1726]

One commenter stated that the complete implementation of the MDI Rules will undermine the Commission's economic analysis of amendments to Rules 610 and 612. The commenter stated: "Implementation of the MDI Rules would … likely mute any potential benefits of or weaken the case for the additional costs associated with the Tick Size Proposal … At minimum, the Commission is obligated to consider the fully implemented MDI Rules as part of the 'baseline' against which the asserted need for this new rule, and its impact, are assessed."[1727]

The MDI Rules form part of the baseline for the amendments to Rules 610 and 612. The MDI Rules and these amendments will increase transparency, achieve better order execution, lower costs, and lead to better investment decisions and increased market efficiency. However, the MDI Rules and these amendments—while sharing broad goals—achieve their benefits through distinct channels; therefore, implementation of the MDI Rules is unlikely to mute benefits arising from these amendments. The channel through which the MDI Rules achieves their benefits is data—the MDI Rules will increase the granularity of data that is included in NMS data and further introduce a decentralized competing consolidator model to lower the cost of purchasing this data. For market participants who already purchase proprietary data from exchanges, the MDI Rules may have a limited direct impact because these participants will not experience a change in their information set. Nonetheless, these participants will still see many benefits from the reduction in tick size and access fee cap. For example, they will be able to

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1726 See also section VII.D.4 (discussing the acceleration and implementation of the MDI Rules).

1727 See Robinhood Letter at 44.

quote at more precise prices, which more accurately reflect the competitive cost of liquidity, and experience fewer instances of tick constraints. Also, any stocks that remain tick-constrained would have fewer distortions due to excess liquidity as a result of the reduction in the access fee cap. Therefore, the benefits of the MDI Rules do not lessen the benefits of the amendments to Rules 610 and 612 for these market participants.

For market participants who do not purchase proprietary data from exchanges, the MDI Rules, once fully implemented, as well as the market data amendments associated with this release, may complement the benefits of amendments to Rules 610 and 612. This is because the MDI Rules, including the amendments in this release, will result in more information being made available to non-consumers of proprietary data, while amendments to Rules 610 and 612 remove constraints on trading by alleviating tick constraints. The amendments in this release to Rules 610 and 612, the amendments to the MDI Rules, and the MDI Rules in total (once fully implemented), will create an environment where there is more, as well as better, information available to market participants that do not subscribe to proprietary data products. These market participants will also have an improved ability to trade on that information due to the lower expected cost of transacting for some stocks due to the lower tick size and access fee. The eventual inclusion of depth-of-book information in core data under the MDI Rules will also mitigate costs from the tick reduction causing liquidity to spread across multiple price points[1728]—market participants will more readily be able to see the liquidity available at these price points.

[1728] See section VII.D.1 for a discussion of this effect.

E. Effect on Efficiency, Competition, and Capital Formation

1. Efficiency

The amendments will improve price efficiency, namely the degree to which the price of a stock reflects its fundamental value. The improvement in price efficiency is expected largely to come through the reduction in the tick size and the reduction of the access fee cap. The acceleration of portions of the MDI Rules could also increase price efficiency, but those effects are largely to accelerate the economic impact already anticipated in the MDI Rules.

Lowering the tick size for some NMS stocks with prices equal to or greater than $1.00, as well as lowering the access fee cap for all stocks to 10 mils for stocks with prices equal to or greater than $1.00, or to 0.10% for stocks with prices lower than $1.00, will increase price efficiency.[1729] The reduction in the tick size for some stocks along with the reduction of the access fee cap for all stocks will lower transaction costs.[1730] When trading becomes less costly, market participants have an increased incentive to gather more information because doing so is more profitable.[1731] Gathering more information and trading on that information means that prices are more reflective of the fundamental value of the firm. Consequently, for stocks that receive an improvement in market quality due to the lower tick size or the reduction in the access fee, the Commission expects an improvement in price efficiency.[1732]

1729 See NASAA Letter at 9, and Vanguard Letter at 6.

1730 As discussed in section VII.B, the reduction in the fee cap will primarily lower trading costs and distortions for stocks that are tick-constrained; for stocks that are not tick-constrained, the reduction in the fee cap may lead to wider quoted spreads which will offset the lower fee. See supra note 1508 for a discussion of the fee cap's contribution to liquidity distortions for tick-constrained stocks; see also supra section VII.D.2.c on the effect of the fee cap reduction for stocks that are not tick-constrained.

1731 See, e.g., Dixon, supra note 1277 for a discussion of this concept in the context of short selling.

1732 Id.

The Commission further expects that quoted spreads will better reflect the cost of liquidity as a result of these amendments. As discussed in section VII.B.3,[1733] high access fees and rebates can distort liquidity supply and demand.[1734] The tick acts as a price floor that prevents the spread from reflecting the true cost of liquidity; likewise, access fees—and the rebates they fund—further distort quoted spreads by taxing liquidity demand and subsidizing liquidity supply at this price floor. By reducing both the tick and the access fee cap, quoted spreads will better reflect the cost of liquidity and allow for more efficient liquidity provision.

Some commenters expressed the concern of diminished intra-tick pricing from reduced access fees.[1735] As shown in the Proposing Release, the NYSE, Nasdaq, and Cboe exchange families each operate both a maker-taker venue and an inverted venue.[1736] Variation in fee and rebate schedules across trading venues effectively allow for intra-tick pricing.[1737] However, that intra-tick pricing via access fees and rebates is an imperfect solution to the problem of a stock having a tick that is too large.[1738] Reducing the access fee cap can reduce the degree to which maker-taker trading centers can offer effective intra-tick pricing which could potentially lead to

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1733 See also Proposing Release, note 11, at 80328: "If tick sizes were infinitely small, and absent other distortions, then fees and rebates would not affect the cost of trading because markets would simply adjust quotes by the amount of the rebate such that the spread with rebates included is the same. However, current U.S. equity markets differ from this frictionless construct because there is a finite tick. In this environment, and particularly for stocks with narrower spreads, high access fees and rebates can distort liquidity supply and demand by artificially increasing the cost of taking liquidity and the revenue to providing liquidity. This dynamic creates an environment with too much liquidity supply relative to liquidity demand."

1734 One commenter stated that the Commission did not explain these distortions, see Virtu Letter II at 16. The subsequent discussion (as well as the discussion surrounding note 1508, supra) explains the distortions.

1735 See also Citadel Letter I at 16, CCMR Letter at 26.

1736 See 87 FR 80313.

1737 See also supra note 1128.

1738 See Quarter Penny Tick, supra note 1127.

pricing distortions – i.e., less efficient prices.[1739] However, the ability for markets to establish efficient prices will increase overall due to the reduced tick size for stocks with TWAQS less than or equal to $0.015. The reduced tick size reduces the need for intra-tick pricing by providing a finer pricing grid on which market participants can submit orders. Specifically, a tick size of $0.005 with an access fee and rebate of 10 mils provides an effective pricing grid with price pints at every $0.005 and plus or minus $0.001, which is finer than the current pricing grid with a tick size of $0.01 and an access fee/rebate of $0.003.[1740] For stocks not subject to the reduced tick size, the Commission acknowledges some reduction in the ability to price intra-tick. However, the efficiency loss is limited due to the fact that, by definition, these stocks have sufficiently wide average spreads, and thus sufficient ticks within the spread, to avoid qualifying for the lower tick size. For these stocks, there is less of a need to price intra-tick.

The reduction in the tick is expected to reduce the cost of transacting on exchanges, which will result in an increase in orders being sent to lit markets.[1741] The reduction in the access fee cap is expected to widen quoted spreads, and the quote differential between lit exchanges and

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1739 See supra note 1128 for an explanation of how variation in fee and rebate schedules across trading venues can increase price fidelity by allowing for more effective intra-tick pricing. Reducing the access fee cap reduces this effective intra-tick pricing by limiting the degree to which fee and rebate schedules can differ from one another.

1740 Under the preexisting Rule 610 fees, maker-taker venues can offer liquidity demanders net prices that are 30 mils worse than quoted prices; inverted venues, in contrast, tend to offer net prices that are 30 mils better than quoted prices, creating a grid of price points that are 40 to 60 mils separated from each other. E.g., the net prices available at a maker-taker venue may be $10.003, $10.013, etc., while the net prices available at an inverted venue may be $9.997, $10.007, etc.; the price points are 40 to 60 mils apart from each other. Under the reduced fee cap, maker-taker venues will only be able to offer liquidity demanders net prices that are 10 mils worse than quoted prices; to maintain a grid of price points that are 50 mils apart, an inverted venue could offer a net price that is 40 mils better than the quoted price by instituting a 40 mil rebate for liquidity takers. E.g., the net prices available at a maker-taker venue will be $10.001, $10.013, etc.; with a 40 mil rebate, inverted venues could offer net price points of $9.996, $10.006, etc., so that the price points are 50 mils apart from each other. See also Quarter Penny Tick, supra note 1127, for a discussion of this concept.

1741 See infra section VII.E.2.a and VII.E.2.b for additional discussion. Specifically see discussion surrounding infra note 1752.

other trading venues may widen. This need not, however, lead to lower demand for lit liquidity, as the access fee, which currently disincentivizes investors to access liquidity on exchanges, will also be lower.[1742] Thus, the net effect of the rules is an increase in orders on lit markets and an improvement in price efficiency.

Some commenters stated that a finer tick size could cause information leakage. Large orders may need to be divided into smaller orders due to the fragmentation of liquidity across multiple price levels; executing a large order may therefore reveal more information, which could increase price impact and trading costs.[1743] The Commission acknowledges that information leakage may, in turn, reduce incentives to collect information ex-ante and thereby reduce price efficiency. However, on balance, the effect of the amendments to increase price efficiency by, on average, reducing trading costs. This is because the cost of information leakage primarily shows up in the form of wider spreads when a large trade is anticipated and higher costs of trading for large orders. If information leakage was a primary—rather than mitigating—effect of the smaller tick size, then in the TSP analysis discussed in section VIII.D.1.b.ii spreads would not have narrowed and round-trip trading costs would not have fallen for stocks with narrow spreads when the tick size was reduced. But this is not what that analysis found; thus, while increased information leakage could be a factor mitigating the reduction in spreads due to the smaller tick size, the net effect is expected to be lower trading costs for stocks receiving the

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1742 See, e.g., IEX Letter VI at 1-6.

1743 See supra notes 1219, 1220 and 1398, as well as related discussion in sections VII.D.1.b.i and VII.D.1.e. The Commission acknowledges that tick-constrained stocks receiving a tick reduction may experience an increase in execution costs for sufficiently large orders—evidence from the TSP suggests that this occurs for orders that are quite large (approximately 50 round lots). See discussion surrounding note 1284.

smaller tick size. Additionally, the commenter's concerns are mitigated by the fact that the amendments do not include the proposed smaller tick sizes (0.001 and 0.002).

Lowering access fees also increases the efficiency with which the quote conveys information regarding the cost of liquidity. As discussed in section VII.D.2.d, access fees that fund rebates contribute to complexity and lack of transparency in markets because they separate both the true cost of demanding liquidity and the proceeds from supplying liquidity, as represented by the quoted half-spread. Reducing the wedge between the spread and the true cost also reduces conflicts of interest between broker-dealers and their customers. Multiple commenters stated that a lower access fee cap would help mitigate the conflict of interest because lowering the access fee is expected to reduce rebates available and thus the incentive to route based on rebates instead of execution quality.[1744]

Making fees and rebates determinable at the time of execution, along with the reduction of the access fee cap could also increase price efficiency by helping minimize potential conflicts of interest.[1745] Fees and rebates create a potential conflict for a broker in situations where incentives related to transaction fees, which are paid by the broker, potentially conflict with incentives to obtain execution quality, which may affect the customer.[1746] This conflict, if acted on, can lead to inefficient order routing and worse transaction outcomes for customers;[1747] it can

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1744 See RBC Letter at 4 stating ("we believe that lowering the access fee cap would lead to a reduction in broker conflicts of interest…"); NASAA Letter at 9 (stating "reducing access fee caps could help reduce incentives for broker-dealers to route orders to trading venues that benefit those broker-dealers (such as venues in which a broker-dealer is rebated), but may provide suboptimal execution to the detriment of the broker-dealer's customers."). See also Themis Letter at 7; supra section VII.D.3.

1745 One commenter stated that they agreed with the Commission's analysis of these effects, see Council of Institutional Investors Letter at 5; see also Themis Letter at 7.

1746 See Vanguard Letter at 6. See also supra sectionVII.D.2 for additional discussion of access fees.

1747 See Retirement Coalition Letter at 2.

also lead to an inefficient incorporation of information into stock prices, harming market efficiency. Making access fees determinable at the time of execution will enhance efficiency by providing market participants with certainty concerning the fees that they will be charged per transaction. This certainty could also allow broker-dealers to examine their own best-execution performance more efficiently. Greater certainty about fees and rebates in advance of routing an order could also increase the efficiency of the broker-dealers' best execution assessments by providing them with greater certainty about the full cost of a transaction when executing the order. Additionally, to the extent that determinable fees make it easier for broker-dealers to communicate fees and transmit them to end customers, doing so could help eliminate distortions that might occur due to potential conflicts of interest. However, to the extent that exchanges are not able to as effectively replicate some incentives that were based on using historical activity,[1748] requiring these fees to be determinable at time of execution may reduce efficiency.

Accelerating the addition of odd-lot information to NMS data and the inclusion of information relating to the best odd-lot quote will realize some of the price efficiency benefits articulated in the MDI Rules at an earlier date, providing improved price efficiency earlier than anticipated in the MDI Rules. Specifically, research suggests that adding information on the shares available at price levels inside the NBBO may improve price efficiency.[1749] Currently only market participants who subscribe to proprietary data feeds can view the odd-lot information and thus adjust trading strategies and decisions based on that information.

1748 See supra section VII.D.3 for further discussion on basing fees and rebates on historical activity.

1749 See Robert P. Bartlett et al., The Market Inside the Market: Odd-Lot Quotes, REV. FIN. STUD. (Sep. 19, 2023), available at https://doi.org/10.1093/rfs/hhad074.

Expanding the SIP feeds to include odd-lot information will provide new information to those investors who subscribe to the SIP data but do not subscribe to proprietary data feeds.[1750]

2. Competition

a. Modification of Rule 612

The amendments will promote competition both on price on a given venue and across venues. This will occur because the amendments will allow liquidity providers to compete at more price points on exchange. By limiting the affected stocks to those with low spreads, the amendments ameliorate possible effects of pennying which may accompany a finer pricing grid.[1751]

In addition, the amendments will improve the efficiency of on-exchange trading, allowing exchanges to better compete with off-exchange market makers. Empirical evidence suggests that, on average, relaxing tick constraints leads to volume moving onto exchanges primarily by improving market quality on the exchanges.[1752] Research suggests that this occurs both because of the reduction in transaction costs resulting from a finer pricing grid, and also

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1750 There is the possibility that competing consolidators may not choose to distribute odd-lot information (because the MDI Rules do not require them to do so), in which case the positive effects of including odd-lots in NMS data on price efficiency will be lost. This outcome is unlikely because the odd-lot information is valuable in terms of having information relevant to stock prices, see Bartlett et al., id, and the alternative to odd-lot information from the competing consolidators would be to subscribe to all of the proprietary data feeds, which is expensive. Given that there will be significant demand for the odd-lot information, competing consolidators will therefore offer the data.

1751 See supra section VII.D.1.b for additional discussion of the effects of pennying.

1752 See two industry studies attached to MEMX Letter at 43-63 and 64-70. These studies examine the relaxation of tick constraints following reverse splits and find that the reduction in on-exchange trading costs results in an increase in on-exchange trading volume. See also Panel A of Table 2 in Bidisha Chakrabarty, et al., Tick Size Pilot Program and Price Discovery in US Stock Markets, 59 J. FIN. MKT. 100658 (2022). This academic study uses the TSP and finds that an increase in tick constraints results in an increase in off-exchange trading volume. See also Amy Kwan et al., Trading Rules, Competition for Order Flow and Market Fragmentation, 115 J. FIN. ECON. 330 (2015). This academic study examines the change in the tick from $0.01 to $0.0001 for orders priced in the vicinity of $1.00, and finds that more volume is executed on exchanges when the trade price dips below $1.00 and is therefore subject to the smaller tick.

because a tick that is too wide creates long queues for limit order execution and increase the incentives to send orders off-exchange.[1753]

The increase in message traffic expected from the reduction in the tick sizes for certain stocks will result in a mild increase in costs to process such traffic for those who receive the relevant data feeds.[1754] Because such technological costs are largely fixed, and do not depend on the size of the broker-dealer, this could disadvantage smaller broker-dealers in the market to provide broker-dealer services to investors.

Some commenters stated that variable tick sizes could increase confusion among investors trading on-exchange, thereby driving orders off-exchange.[1755] The potential for investor confusion is addressed generally in section VII.D.1.d. To the point about confusion due to a smaller tick size driving order flow off of exchanges, this is unlikely. The ability to trade at finer price points, and the reduced need to wait in the queue should contribute to on-exchange trading, not off-exchange trading. Indeed, relaxing of tick constraints has been associated empirically with volume moving on-, not off-exchange.[1756]

One commenter asked the Commission to consider the competitive effects of Rule 612 on stocks that have similar quoted spreads but fall just on either side of the threshold, specifically similar ETPs that may have quoted spreads that are similar but fall on either side of the threshold and so receive different tick sizes.[1757] The commenter considers two issuers, Issuer A and Issuer B, and explains that a narrower tick sizes for Issuer A could attract more liquidity to Issuer A's

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1753 Id.

1754 See supra section VII.D.1.c.

1755 See Themis Letter at 6 and Cboe Letter II at 7.

1756 See supra note 1752.

1757 See SIFMA Letter II at 41.

stock and less liquidity to Issuer B's stock. Once Issuer A's stock attracts more liquidity, its spreads could potentially narrow further, perpetuating a cycle in which Issuer B's shares are unable to catchup to Issuer A. The Commission, however, does not expect significant competitive effects in this situation. While the evidence suggests that stocks with quoted spreads less than the threshold will, on average, benefit from the lower tick, those benefits attenuate as spreads widen.[1758] Thus, for stocks or ETPs with spreads right at the threshold, the differential effect of the smaller tick size may be relatively small.

b. Lower Access fee Caps

The amendments to Rule 610(c) reducing the access fee cap will have varying effects on competition between trading venues as well as competition between broker-dealers. The Commission does acknowledge that it would limit the ability of exchanges to differentiate themselves from other exchanges on the basis of their pricing schedules; however, the Commission expects that exchanges will continue to set fees and rebates at or near the access fee cap. A lower access fee cap mechanically reduces the range over which pricing tiers can vary, potentially reducing the economic differences between pricing tiers thereby reducing the benefits from routing order flow for the purpose of qualifying for one tier over another. This can reduce the competitive wedge between high and lower volume broker-dealers due to volume discounts making it easier for lower volume broker-dealers to compete with larger volume broker-dealers.

Commenters disagreed regarding the effects of the 10 mils cap relative to the 15 mils/30 mils alternative in terms of the competitive dynamics between on- and off-exchange venues, with some commenters arguing that reducing the access fee cap would cause a shift to on-exchange

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[1758] See supra section VII.D.1.

trading while others arguing it would cause a shift to off-exchange trading.[1759] The Commission's discussion in section VII.D.2.c suggests that it is unlikely that significant activity will be driven off-exchange, and it is possible that activity may come on-exchange as a result of the lower access fee cap. Moreover, the lower access fee cap will improve competition relative to the 15 mils/30 mils alternative in that it will reduce information asymmetries among investors, better aligning displayed prices with the actual costs of transactions.[1760]

Some commenters expressed that the reduction in access fees will impede exchange competition by reducing their ability to offer differentiated pricing.[1761] One commenter stated that this will particularly disadvantage new exchanges with limited opportunities for differentiation.[1762] Another commenter stated that the inability to differentiate based on fees and rebates will lead volume to congregate on the listing exchange to the detriment of non-listing exchanges.[1763]

The Commission acknowledges that lowering the access fee cap will mechanically limit the extent to which exchanges can potentially differentiate themselves based on varying pricing schedules and diminish their ability to compete on the basis of their pricing schedules. However it is not clear if the amount of differentiation or degree of competition will diminish because exchanges do not appear, in the markets today, to be competing on the basis of offering

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1759 We focus on the competitive effect of the access fee cap relative to the alternative, as failure to reduce the access fee cap in the presence of the tick constraint would lead to a loss of price coherence. For commenters stating that reducing the access fee cap would increase off-exchange volume, see, e.g., Nasdaq Letter II at 4 and Cboe Letter IV at 2-3. For commenters stating that reducing the access fee cap would increase on-exchange volume, see IEX Letter VI at 7.

1760 See IEX Letter VI at 4-6.

1761 See Fidelity Letter at 14, Virtu Letter II at 10, Cboe Letter II at 8, and Citadel Letter I at 24.

1762 See Virtu Letter II at 19.

1763 See Cboe Letter II at 7.

substantially different pricing schedules or models.[1764] The vast majority (≥85%) of on-exchange trading volume executes on exchanges with maker-taker pricing models and with baseline access fees near the cap and rebates slightly lower than the access fee cap. [1765] The few exchanges which deviate from this pricing style do not execute a large proportion of trading volume.[1766] Additionally, smaller or newer exchanges (which do not belong to one of the three large exchange families) have adopted similar pricing schedules and thus do not seem to be competing for order flow by differentiating their pricing schedule. For example, MEMX, the exchange with the most market share not affiliated with one of the three large exchange families, adopted a similar maker-taker pricing schedule to what is prevalent in the market. Additionally, IEX, a formerly flat-fee exchange, has recently switched to a maker-taker pricing model, citing the need to incentivize liquidity provision.[1767] This is in line with the discussion in section VII.C.2, which explains how the structure of markets today incentivize the adoption of maker-taker pricing where access fees are set at or near the access fee cap in order to fund large maker rebates as a means of attracting competitively priced quotes, which in turn increase the trading volume executed on the exchange. Lowering the access fee cap does not change this dynamic, and so the

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1764 As explained in section VII.C.2, exchanges can differentiate themselves by offering different fee schedules – e.g., inverted, flat fee, or maker-taker with numerous price strata. Reducing the access fee cap can reduce the variation in rebates and fees across venues by narrowing the viable range for fees and rebates thereby making the different exchange price schedules more similar. However, many price schedules are already quite similar despite the 30 mil access fee cap allowing for a greater degree of differentiation. For instance, the data reported in Table 4 does not show that there is currently a large degree of variation in the highest fees charged, particularly among maker-taker exchanges which dominate the market. Additionally inverted exchange fees are all set close to the access fee cap.

1765 See Table 5.

1766 Id.

1767 Self -Regulatory Organizations; Investors Exchange LLC; Notice of Filing and Immediate Effectiveness of Proposed rule Change Pursuant to IEX Rule 15.110 to Amend IEX's Fee Schedule, Securities Exchange Act Release No. 98063 (Aug. 4, 2023), 88 FR 54373 (Aug. 10, 2023).

Commission expects that exchanges will continue to set fees and rebates at or near the lowered access fee cap.

When stating that a lower access fee cap would limit competition by restricting differentiation, one commenter pointed out that when one exchange switched from a flat rebate model to a tiered pricing model that exchange quoted at the NBBO more often.[1768] This is consistent with a tiered pricing structure discouraging order routing to competing venues. In this case switching to a tiered pricing schedule incentivized that exchange's members to not route orders to competing exchanges to collect the benefits associated with high volume tiers. More orders sent to the exchange incentivizes more aggressive quoting on the exchange leading the exchange to quote at the NBBO more often. However, the effect on tiering from the amendment's reduction in the access fee cap would be different from this example because the reduction in the access fee cap would apply to all exchanges, meaning that the effect on competition from tiering will also be diminished across all exchanges. Therefore, the effect that a lower access fee cap would have on one exchange's ability to more consistently quote at the NBBO is likely to be weaker than that stated by the commenter.

One commenter expressed the concern that the reduced access fee cap may also result in exchanges increasing the cost to access market data or sell preferential access to exchange data to some members but not to others.[1769] The adopted amendments address this concern as compared to the proposal by eliminating the proposed requirement for an access fee cap of 5 mils on some stocks. One commenter stated that while it is possible that a sufficiently low cap could

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1768 See Cboe Letter III at 8.

1769 See RBC Letter at 4.

generate this concern, the access fee cap of 10 mils strikes the right balance.[1770] Furthermore, as explained in section VII.D.2.b, the Commission does not expect exchange transaction revenues on transactions priced greater than $1.00 to substantially change as a 10 mil access fee cap is expected to be high enough that exchanges can continue to realize their current net capture rates for these transactions.

Reducing the access fee cap may also impact competition between broker-dealers who are exchange members, to the extent that a lower access fee cap diminishes the marginal benefit of qualifying for a pricing tier with lower fees or higher rebates over another tier with less preferential terms. Different transaction pricing tiers, particularly volume-based pricing tiers providing more favorable fees and/or rebates to exchange members who execute higher relative order volume, introduce a competitive wedge between those exchange members who qualify for the better tiers and those who do not. Another commenter stated that high access fees disproportionately affect smaller firms and investors, and lowering the access fee cap would promote a more competitive and diverse market landscape.[1771] The commenter stated that exchanges employ pricing tiers to extract rents from smaller exchange members which are then split between the exchange and their high tier members, and lowering the access fee cap would limit the extent to which this can occur.[1772] Under the assumption that a reduction in access fees would be accompanied by a reduction in transaction rebates, one possible effect of reducing the access fee cap would be to diminish the relative differences in the fees charged and rebates

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1770 See Verret Letter I at 8.

1771 See Verret Letter I at 9.

1772 Id. at 6, 7.

offered between different pricing tiers.[1773] As shown in Table 4 multiple exchanges have fee or rebate tiers which vary within a range that is greater than 10 mils. Therefore, lowering the access fee cap to 10 mils will necessitate that pricing tiers would have to be placed within a narrower price range. The Commission expects that as the differences between pricing tiers become less economically meaningful, the competitive wedge introduced by pricing tiers will diminish, which would make it easier for exchange members lacking scale to compete with exchange members that qualify for preferential pricing tiers (i.e., tiers with higher rebates/lower fees).

Another commenter stated that although the access fee cap would be lowered, it could still allow sufficient room for existing differences in preferential pricing to persist.[1774] The commenter used the example of a large bank and small broker both paying a 30 mils rebate with the bank receiving a 32 mils rebate and the broker receiving 24 mils. Under a 10 mils access fee cap, the exchange could offer a 12 mils rebate to the bank and 4 mils to the broker. In that case the differential between the bank and the broker would remain the same despite the reduced access fee cap. In the example provided by the commenter, the exchanges could continue to offer a fully funded rebate to some exchange members, which is 8 mils greater than offered to other exchange members, because that 8 mil differential would be allowed under a 10 mil access fee cap. The Commission acknowledges that exchanges would be able to continue to offer differentiated pricing; however, a lower access fee cap would reduce the extent to which pricing tiers can differ and limit the aggregate fees available to the exchange to redistribute among its

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[1773] According to Table 4 the differences in pricing tiers for many exchanges exceed 10 mils therefore if the number of pricing tiers does not decrease, by necessity, the average difference between the tiers would diminish.

[1774] See Healthy Markets Letter I at 23-24.

members in the form of rebates. It is more difficult for an exchange to fund high rebates, particularly those greater than the fee cap, under a lower access fee cap.

c. Acceleration of the MDI Rules, Addition of Information About Best Odd-Lot Orders, Fees and Rebates Determinable at Time of Execution

Accelerating the inclusion of odd-lot information in the NMS data, along with the implementation of the MDI Rules round lot definition, might lead to increased competition between exchanges and ATSs and OTC market makers, including wholesalers. NMS stocks priced greater than $250.00 are expected to benefit sooner from a tighter NBBO, thereby increasing the competitiveness of the best displayed protected quotes. Greater visibility of more competitively priced odd-lot orders inside the NBBO could increase the competitive position of exchanges and ATSs and attract greater order flow. This effect will be temporary, only lasting until the full implementation of the MDI Rules. After the full implementation of the MDI Rules, the effect on competition is accounted for in the MDI Adopting Release and is not ascribed to these amendments.

Making exchange fees and rebates determinable at the time of execution will enable the customers of broker-dealers to better discuss transaction fees and rebates with their broker-dealers, and potentially request data on the exchange fees incurred by an order,[1775] which will increase competition between broker-dealers along this dimension, leading to better order

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[1775] For example, some brokers allow customers to direct an order to a particular exchange. By making the fees and rebates determinable at execution, the broker may be better able to inform the customer of the net transaction price of a prospective directed order.

execution and lower costs.[1776] In particular, while there is currently no requirement to either pass on the fees and rebates to customers, or account for fees and rebates when assessing execution quality, there may be competitive pressure to do so as a result of the amendments because a competing broker-dealer will be able to include fees and rebates in its transaction cost analysis, or simply pass them through to the customer. One commenter stated that the requirements for exchange pricing under this rule change will be "even more anti-competitive" than the current practice, because this would mean that "smaller brokers can't attract new flows based on modelling of what such flows will do to their rates upon arrival."[1777] The Commission disagrees with the statement that this rule change will make the market for offering executing broker services more anti-competitive. As described in section VII.D.3, this rule change allows brokers to determine their fees and rebates at execution and thereby eliminates the need for forecasting future market outcomes in order to anticipate the fee that will be incurred by an order. To the extent such forecasting is more difficult for small brokers, the rule change will make it easier for small brokers to compete.

Including odd-lot information in the exclusive SIPs and providing the best odd-lot order information will enhance competition among broker-dealers. Making the best odd-lot order information accessible through the exclusive SIPs will facilitate better analysis of a broker-

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1776 Under the baseline it would be difficult in many cases for a broker-dealer to allocate specific rebates received or fees paid to one customer's trade because the fees or rebates in a given month are based, in many instances, on that broker-dealer's total trading volume across all customer accounts, see section VII.C.2.b. However, if the fees and rebates are determinable at the time of execution the broker-dealer could feasibly track a specific fee or rebate to a specific trade, making it possible for a customer to receive such information.

1777 See Danny Mulson Letter.

dealer's execution quality than is available with just NBBO data.[1778] Thus, it could be easier for some customers to monitor the performance of their broker-dealers.[1779]

Accelerating the inclusion of odd-lot data into the exclusive SIPs will increase competition among data providers of odd-lot information prior to the full implementation of the MDI Rules, though it will do so less than envisioned in the MDI release for the period until the MDI Rules are fully implemented. Specifically, under the implementation schedule in the MDI Rules, adding odd-lot information to core data was to occur during the parallel operation period. Adding odd-lot information to the current exclusive SIPs will enable the exclusive SIPs to compete directly with the exchanges' proprietary data products for use in visual display settings. Without this change, the only means to get odd-lot information is to subscribe to multiple proprietary data feeds. This will change when odd-lots are a part of SIP data.

Unlike the data provided by the competing consolidators, the current exclusive SIPs are not fast enough for use in certain trading.[1780] Thus, the competition for odd-lot data will be limited to odd-lot information used in visual display settings. To the extent that some market participants subscribe to proprietary data for use in visual display settings, the introduction of odd-lot information to the exclusive SIPs will provide competition to this segment of the market and reduce the prices of odd-lot information provided by the proprietary data feeds. However, the Commission does not believe that this market is very large. Currently, for most display

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1778 See supra note 1621, for a discussion on the incentives that institutional traders have to monitor all aspects of transaction costs.

1779 It is possible that some institutional traders have access to proprietary data feeds that provide the ability to benchmark trades against odd-lot orders. Or, they could contract with specialized firms that have access to the data and provide transaction cost analysis.

1780 See MDI Rules for a discussion of the SIPs' higher latency relative the proprietary feeds offered by exchanges. In particular, footnote 26 on page 18599 summarizes commenters' views on the disadvantages of using SIP data instead of proprietary feeds.

settings, market participants use SIP data or one of the top of book data products offered by one of the three highest volume exchange groups; it is unclear to what extent market participants subscribe to proprietary data with odd-lot information for use in visual display settings.

With respect to competition for top-of-book (TOB) data, the exclusive SIPs face competition from exchanges' TOB data products. As discussed in the MDI adoption,[1781] these proprietary products are typically less expensive and contain less content—being derived from a single exchange or exchange family—than the exclusive SIPs. If the exclusive SIPs charge more for data on account of the increased costs associated with disseminating odd-lot information, then this may provide a competitive advantage to providers of proprietary TOB products.

Requiring the exclusive SIPs to disseminate the accelerated odd-lot information until the exclusive SIPs are retired will guarantee that the odd-lot information will be disseminated.[1782] However, this requirement may also affect competition among competing consolidators once the MDI Rule is fully implemented. On the one hand, these new requirements on the SIPs could reduce competition among competing consolidators and therefore reduce the expected benefits of the MDI Rules. This reduction in competition could occur because the amendments may increase the competitive advantage of exclusive SIPs relative to non-SIP competing consolidators because the SIPs will have established a market for odd-lot information before having to face competition. That is, the SIPs will have time to acquire customers for odd-lot information before other competing consolidators can enter. These customers may then face costs should they

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1781 See MDI Adopting Release, supra note 10 at 18603.

1782 See supra section VII.D.4.c for additional discussion. While the amendments require the exclusive SIPs to distribute odd-lot data, the MDI Rules do not require the competing consolidators to disseminate odd-lot data. However, the MDI Adopting Release anticipated that at least one competing consolidator will do so because there would be demand for the data.

switch to a non-SIP competing consolidator; these switching costs may dissuade entry by non-SIP competing consolidators and thereby lower competition.[1783]

On the other hand, the Commission is uncertain whether the SIPs will become competing consolidators.[1784] The amendments' requirement for SIPs to disseminate odd-lot information reduces the incremental costs that the SIPs would need to bear in order to become competing consolidators. Therefore, these amendments make it more likely that the SIPs will register as competing consolidators, which would improve competition relative to a scenario in which they do not compete.

Further, non-SIP competing consolidators will still have an opportunity to compete for significant market share. As discussed above, SIPs face latency disadvantages relative exchanges.[1785] If competing consolidators can offer a lower latency product, then they can capture a part of the market that the amendments will not affect—those customers who will use odd-lot information in ways other than visual display.[1786] Likewise, competing consolidators can offer depth-of-book data under the MDI Rules, which the SIPs are not required to disseminate under these amendments. If these markets are significantly bigger than the odd-lot visual display market, the competitive advantage of the exclusive SIPs will be less likely to dissuade entry, and non-SIP competing consolidators could have sufficient incentive to enter the market.[1787]

1783 See MDI Adopting Release, supra note 10, for further discussion of how competing consolidators have higher barriers to entry than exclusive SIPs, such as in the form of compliance costs associated with Regulation SCI.

1784 See supra note 1782.

1785 See supra note 1780.

1786 See discussion around note 1780, supra explaining that the SIPs' latency disadvantage makes their data useful for visual display.

1787 In the MDI Adopting Release, the Commission anticipated that both exchanges operating exclusive SIPs would have strong incentives to enter the competing consolidator market. See MDI Adopting Release, supra note 10, at 18761.

3. Capital Formation

The Commission expects that the amendments will promote capital formation. First, the combined effect of the amendments will be to increase liquidity generally, which will increase incentives to trade and therefore price efficiency. Price efficiency in turn promotes capital formation. The Commission also expects that the alleviation of tick constraints and the lower access fee cap will work together and separately to lead to displayed prices that are more reflective of supply and demand for the underlying securities, also promoting capital formation.

One commenter stated that a narrower tick could increase volatility and decrease liquidity which could discourage companies from going public.[1788] As discussed in section VII.D.1, stocks receiving the $0.005 tick on average will not experience harmful liquidity effects. On the contrary, as discussed in section VII.D.1, the expectation is that on average liquidity will improve for stocks with narrow quoted spreads that receive the tick size reduction. Additionally, as discussed in section VII.D.1, the narrower tick will not result in increased volatility.[1789] Consequently, even if there was a link between liquidity and volatility, and the decision to go public, those channels aren't expected to be affected in the manner mentioned by the commenter. Further, the link between tick sizes and IPOs is not clearly defined in existing research.[1790]

1788 See RBC Letter at 3.

1789 See supra notes 1209 and 1210 and surrounding text for a discussion of tick sizes and volatility.

1790 Research on this topic is exceptionally difficult. As stated in the report Assessment of the Plan to Implement a Tick Size Program, "There are myriad factors influencing companies' decisions about whether to go public or remain private — and, if an IPO is desired, in which country to list shares. These include the availability of capital outside the public equity market, the regulatory burdens placed on public companies, market conditions, broader macroeconomic trends and differences in economic conditions between countries globally. Additionally, broader historical context may reveal certain periods of strong IPO issuance, particularly during times of high speculative activity in markets, as anomalous and unsustainable." See Securities and Exchange Commission, Assessment of the Plan to Implement a Tick Size Pilot Program (Jul.3, 2018), available at https://www.sec.gov/files/TICK%20PILOT%20ASSESSMENT%20FINAL%20Aug%202.pdf (last accessed Feb. 6, 2024).

Commenters expressed the concern that wider spreads and reduced depth would negatively impact capital formation for growth companies.[1791] Commenters specifically mentioned the importance of rebates for small and medium-sized growth companies, without which "market makers may no longer find it profitable to make tight markets."[1792] Two considerations enter in determining the effect of capital formation. First, for illiquid stocks, spreads are the primary determinant of revenue for liquidity providers. The rebate makes less of a difference on a percentage basis then for stocks that are more liquid. Second, the Commission does not expect the cost of transacting in illiquid securities to rise, net of fees and rebates.[1793] While the Commission acknowledges the crucial role of the ability of investors to transact for capital formation, it is not quoted spreads that matter to investors but rather the net spread available on exchange. In sum, liquidity is expected to improve for stocks with narrow quoted spreads that receive the tick size reduction—as discussed in section VII.D.1—and liquidity is not expected to be harmed for stocks that do not receive the tick size reduction—as discussed in section VII.D.2. Therefore, the amendments are expected to improve liquidity and thus will not impede capital formation through this channel.

F. Reasonable Alternatives

This section considers alternatives to the amendments. In the Proposing Release, we considered the benefits and costs of multiple categories of alternative, and variations within those

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1791 See Nasdaq Letter I at 24.

1792 See Nasdaq Letter I at 25. See also Virtu Letter II at 10.

1793 One commenter, stating that the reduced access fee cap would reduce "incentives for liquidity in thinly traded securities," cited a study showing that an improvement in liquidity from stock splits resulted in significant reductions in the cost of capital for firms that did a stock split (Virtu Letter II at 8, citing Ji-Chai Lin, Ajai K. Singh &Wen Yu, Stock Splits, Trading Continuity, and the Cost of Equity Capital, 93 J. FIN. ECON. 474, 475 (Jan. 1, 2009)). As stated above, because the reduction of the access fee will not result in an increase in the cost of liquidity, see supra section VII.D.2.c, discussing this point, there is no reason to expect the cost of capital to increase as a result of lowering the access fee cap.

categories.[1794] For brevity we do not repeat that discussion here. Instead, this section focuses on additional alternatives suggested by commenters, to the extent they are not incorporated into the adopted amendments. We organize subsections around key elements of the Rule: tick size, minimum trading increment, access fee, and MDI and BOLO.[1795]

1. Tick Size Alternatives

a. Alternative Criteria for Selecting Stocks Receiving a Smaller Tick Size

Commenters suggested alternative methodologies for identifying which stocks should receive a smaller tick size.[1796] These alternative methodologies are discussed in greater detail in section VII.D.1.b.iii and generally center on adding additional criteria, in addition to the TWAQS, to determine which stocks should qualify for a lower tick size.[1797] In that section, analysis failed to find evidence that the additional criteria would avert harm to market quality. One reason for this is likely that much of the information contained in these additional thresholds suggested by commenters is already contained in the TWAQS.[1798]

Moreover, implementing these alternatives would increase the complexity of the amendments from the perspective of the listing exchanges, who would be required to track and implement multiple thresholds to identify tick-constrained securities. Increased complexity would increase the compliance costs of the amendments for these entities. Complexity would

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1794 See Proposing Release, supra note 11, at 80339.

1795 Some commenters discussed "no action" as an alternative to the proposed rules. See, e.g., Virtu Letter II at 22-23. For purposes of the economic analysis, the baseline describes the world as it would exist without the rules.

1796 See supra section VII.D.1.b.iii for additional discussion of these methodologies.

1797 See supra note 1311 for discussion of specific commenter suggestions.

1798 See supra note 1318 and surrounding discussion.

also increase for broker-dealers and investors, who would be required to take these changes into account. These alternatives would likely not affect the compliance costs of the rules for other market participants relative to the adopted amendments. This is because these alternatives would not change how these entities learn which stocks are subject to the $0.005 tick and which are subject to the $0.01 tick size in terms of assessing lists from the listing exchanges' websites, and the need to update systems to implement the different tick sizes.

The biggest effect of these alternatives relative to the adopted amendments is that they would reduce the number of securities receiving a reduced tick size. For example, one proposed alternative would limit the number of securities receiving a smaller tick size to an estimated 58 stocks.[1799] Commenters stated that limiting the sample via additional thresholds and criteria would ensure that only the stocks that are absolutely the most likely to benefit from a smaller tick size would receive the smaller tick size.[1800] However, the drawback to this more limited approach is that the analysis presented in sections VII.D.1.b.ii and VII.D.1.b.iii suggests that many stocks that would not qualify for the lower tick size under these alternative thresholds would likely still benefit from reducing the tick size. This conclusion is supported by the findings in Table 9 which demonstrate that across many dimensions TSP stocks with narrow spreads that are nonetheless in the bottom quartile based on depth, price, or trading volume, i.e., those that commenters suggest could perhaps be excluded from receiving the lower tick size, still experienced market quality improvements across many dimensions with a smaller tick. This analysis also fails to find statistically significant evidence that such stocks would be harmed. Consequently, adding additional criteria would add complexity to the implementation of the

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1799 See Cboe Letter II at 5.

1800 See supra section VII.D.1.b.iii for additional discussion.

Rule, increasing the compliance costs of the rule, and would have lower benefits than the adopted amendments because it would leave some stocks with a wider tick size than would be optimal.

b. Alternative Threshold For Lower Tick Size

Some commenters suggested that the Commission adopt a threshold for the lower tick size that is different from the adopted amendments. The most common alternative suggested was a TWAQS of $0.011 threshold.[1801]

The Commission estimates that the costs to implement this alternative would be similar to the adopted amendments because all affected entities would be required to perform the same work as in the adopted amendments. From an implementation perspective, the key difference between this alternative and the adopted amendments would be the considerably reduced number of stocks that would qualify for the alternative's lower tick size.

This alternative would more specifically target trading volume that is nearly always trading at the minimum trading increment. This alternative would leave stocks with quoted spreads between $0.011 and $0.015 with the $0.01 tick size, whereas the adopted amendments assign a tick size of $0.005 to such stocks. Using the same methodology as is used in Table 7 there would be an estimated 1,216 stocks receiving a $0.005 tick size under this alternative, a reduction of approximately 572 stocks compared to the adopted amendments. These omitted stocks have between 1.1 and 1.5 ticks intra-spread on average. Research and Commission analysis as well as commenters' analyses suggest that 2 to 4 ticks intra-spread is likely an

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[1801] See, e.g., UBS Letter at 10 and JPMorgan Letter at 4. With a $0.011 threshold, following the methodology employed in Table 7, an estimated 1,216 stocks would receive the lower tick size, with a $0.02 threshold an estimated 2,339 stocks would receive the lower tick size.

optimal range for stocks.[1802] Thus, assigning stocks with a quoted spread between $0.011 and $0.015 to a tick size of $0.01 – resulting in 1.1-1.5 ticks intra-spread – is likely to produce worse market quality outcomes than assigning these stocks a $0.005 tick – which would result in 2.2-3 ticks intra-spread. Thus, under this alternative these stocks, on average, would be expected to have lower overall market quality relative to the adopted amendments. Specifically, analysis in Table 8 of stocks in bin 2, which had 1-2 ticks intra-spread during the TSP, experienced significant improvements in market quality when the TSP tick size was relaxed – providing evidence that such stocks would benefit from a lower tick size. Consequently, this alternative, by failing to reduce the tick size for stocks that evidence suggests would benefit from a tick size decrease, would have lower benefits compared to the adopted amendments, while having similar costs.

c. Alternative Measurement Horizons for TWAQS and Effective Periods for Tick Sizes

Some commenters suggested alternative measurement horizons to determine the TWAQS as well as alternative periods that the tick size would be effective.[1803] Much of the analysis of alternative measurement horizons for the time weighted quoted spread as well as alternative operative periods for tick sizes is contained in VII.D.1.d. In sum, the analysis in that section presents tradeoffs. On the one hand, a shorter evaluation period ties the tick size to the most recent market experience for a given stock potentially resulting in the most relevant tick size to be assigned. On the other hand, if that time period is associated with transient spikes in quoted spreads, such as during the first quarter of 2020 coincident with the onset of the Covid-19

1802 See supra section VII.D.1.b.ii.

1803 See, e.g., FIA PTG Letter II at 2 and JPMorgan Letter at 4.

pandemic, then the time period used to assign tick sizes would not be representative of current market conditions and a stock may be assigned a sub-optimal tick size.

There is also a tradeoff associated with the length of time that tick sizes are effective. More frequent updating means the tick size can adjust more rapidly to changes in the trading environment for a given stock and thus could increase the amount of trading volume associated with optimal tick sizes. The downside is that more frequent updates would also increase the cost and complexity of the amendments as market participants would have to adjust to tick sizes that change more frequently.

The Commission analyzed many iterations of evaluation period and tick size operative period and found evidence consistent with these tradeoffs.[1804] Consequently, depending on the combination of period used to determine the TWAQS and the effective period for the tick size, the total fraction of trading volume that trades in the preferred range may increase or decrease relative to the adopted amendments as suggested by the analysis in Table 10. Additionally, the costs and complexity of the alternatives would similarly be affected by alternative horizons chosen with more frequent updating associated with higher costs and complexity and less frequent updating associated with lower costs and complexity relative to the adopted amendments.

For example, as shown in Panel A of Table 10, an alternative which would have a one-month evaluation period and a one-month effective period for a tick size would reduce the amount of estimated trading volume that trades with a wide tick and likely would have benefited from a smaller tick to 8.5%, compared to an estimated 13.7% in the adopted amendments.

[1804] See supra section VII.D.1.d.

Consequently, more trading volume would be assigned a tick size that is expected to improve market quality for the stock. However, relative to the adopted amendments this alternative would have 12 tick size changes per year instead of the adopted 2 changes, thus it would increase the complexity and compliance costs associated with the rule. Overall, relative to the adopted amendments, this alternative results in a significant increase in complexity but only achieves a relatively modest increase in effectiveness in terms of trading volume with the appropriate tick size.

On the other side of the spectrum, a rule that uses a 12-month operative period could produce the opposite effect. It would reduce complexity somewhat by reducing the number of revisions, but with a significant decrease in effectiveness of the tiered tick size regime. For instance, again using data from Table 10, this alternative would increase the amount of trading volume that retains the larger tick size but would likely benefit from a smaller tick size to 20.8%, up from an estimated 13.7% associated with the adopted amendments.

2. Access Fee Alternatives

a. 15 mils / 30 mils Access Fee

Some commenters recommended adopting a two-tier approach to existing Rule 610(c)'s uniform maximum access fee cap. Specifically, these commenters recommended an access fee of 15 mils for stocks with a $0.005 cent tick and maintaining the 30 mils maximum access fee for

stocks that continue to have a $0.01 cent tick (15 mils/30 mils alternative).[1805] This 15 mils/30 mils alternative would be applied to stocks priced $1.00 or more.[1806]

According to one commenter, this approach would be beneficial because the higher rebate cap for $0.01 tick stocks would maintain incentives to provide on-exchange lit liquidity.[1807] The Commission acknowledges that the lower access fee cap on stocks with the higher tick is likely to widen spreads. As discussed in sections VII.D.2.c and VII.E.1, these wider spreads will not lead to a diminution of lit liquidity on exchanges. Rather, liquidity providers will adjust their quotes to reflect the change in fees and rebates, resulting in higher quoted spreads without an increase in transaction costs nor a decrease in lit liquidity.

Relative to the adopted amendments, this alternative would raise costs by causing stocks to oscillate between the two tick sizes, resulting in the tick size being consistently mis-assigned for the oscillating stocks. Specifically, the 15 mils/30 mils alternative would result in a feedback loop scenario on tick size assignment from tying fee caps to tick size. As discussed in sections

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1805 See, e.g., NYSE Letter I at 7 and Nasdaq Letter IV at 2. Nasdaq's alternative assumes that the Commission will adopt only one additional reduced tick size bucket of $0.005 and a uniform access fee of $0.10. Nasdaq Letter IV. See also NYSE, Schwab, and Citadel Letter at 2 ("we recommend a reduction that is proportionate to the proposed reduction in the minimum quoting increment for tick-constrained symbols. This would reduce the current $.0030/share cap to $.0015/share for the symbols with a half-penny minimum quoting increment"); Nasdaq Letter I at 2; MMI Letter at 7 ("access fees should be scaled based on 30% of the minimum pricing increment"); Robinhood Letter at 5, 56-59 ("the Commission should tie access fee caps to be consistently proportional to the applicable tick size at the current proportion of 30%"); and MEMX Letter at 23-24 ("Lower the access fee cap in tick constrained NMS Stocks to $0.0015 to maintain the proportionality of access fees and tick sizes, and include auction fees within the scope of the rule to prevent competitive distortions that would otherwise result if listing exchanges were permitted to use auction fees to avoid a lower fee cap").

1806 Commenters recommending this alternative did not address the treatment of sub $1.00 stocks. For purposes of this discussion, we assume a proportionately reduced 0.15% access fee cap for those stocks. This access fee cap percentage relative to the adopted amendments would mitigate the expected reduction in exchanges' revenue resulting the lower access fee cap. Cf. Cboe Letter I (not recommending any reduction in access fees but, if access fees are reduced, recommending that the access fee [for stocks priced equal to or greater than $1.00] should not be reduced below $.0015 for tick constrained securities with a $0.005 [tick] increment. For securities priced less than $1.00, the access fee cap must remain unchanged to support competition, differentiation, and liquidity provision.").

1807 Nasdaq Letter IV at 11 and passim. See also supra notes 529 and 535 and accompanying text.

VII.B.3 and VII.C.2.b, access fees are tied to rebates, which in turn influence quoted spreads. Consider, for example, a stock that trades in an Evaluation Period, on average, with a 1.4 cent TWAQS and 30 mils access fee cap (and rebate). Under the amendments to Rule 612, this stock would receive a 0.5 cent tick. If this stock were to also to be subject to the 15 mils /30 mils alternative, it would thus be subject to a 15 mils fee cap once it receives the smaller tick size, instead of a 30 mils one, and its average TWAQS would increase to 1.7 cents (increase by twice the 0.15 cents reduction in rebates as result of the lower access fee cap).[1808] But with a TWAQS of 1.7 cents the stock in a subsequent Evaluation Period would receive a tick of 1 cent and the access fee cap would again be 30 mils.[1809] At that point, the aforementioned process would begin again: the stock would yo-yo between tick sizes of 0.5 cents and 1 cent and access fee caps of 15 mils and 30 mils, generating investor confusion and additional costs.[1810] In contrast, consider what would happen to this same stock under a uniform 10 mils access fee cap. The average quoted spread would widen from 1.4 cents to 1.8 cents, at which point the stock would not be subject to a tick size reduction and there would be no oscillations. The same problem would occur even with a lower threshold for a tick size reduction (e.g., if the TWAQS threshold for the

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[1808] It is not necessary to assume that the exchange rebates the entire access fee. Rather, it is sufficient that the difference between the rebate under the access fee cap of 0.30 mils and the rebate under the access fee cap of 0.15 mils is 0.15. The example is not changed if the rebate goes from 0.28 mils to 0.13 mils.

[1809] As discussed above in section VII.D.1, the stock's having a 0.5 cent tick would likely lead to a narrower quoted spread than 1.7 cents. However, if the smaller tick causes the quoted spread to fall by anything less than 0.2 cents, the tick and access fee cap would revert back to 1 cent and 30 mils after the next Evaluation Period.

[1810] One commenter stated that, "the Commission should consider the possibility of tick size oscillation for some stocks that fall close to the threshold values for TWAS." The commenter stated that such oscillation will impose excessive costs. See Mitre Corp. Letter at 5. See also section VII.D.1.d for a quantitative analysis on the tradeoff between appropriate tick assignment and the number of tick changes when evaluating the length of the evaluation and operative periods. The oscillation discussed in this alternative does not present such a tradeoff—this oscillation results in both more tick changes and more tick misassignment.

0.5 cent tick were to be set at 1.1 cents instead of 1.5 cents, then the 15 mils/30 mils alternative would result in spreads oscillating between 1.05 and 1.35 cents for some stocks, causing them to yo-yo between tick sizes). Moreover, oscillation would also occur if one were to add other metrics to the TWAQS threshold for smaller tick sizes because there will still be stocks near the TWAQS threshold. The simplest, and perhaps the only, way to avoid this feedback loop is to use a uniform access fee cap.

The 15 mils/30 mils alternative would also increase complexity because the higher level of fees and rebates create a larger wedge between the quoted half-spread and the true cost of demanding liquidity.[1811] Further, this alternative would reduce some benefits related to the minimum pricing increment, most substantially for stocks with the penny tick. As discussed in section VII.C.1.b, these stocks may have, at times, an economic spread that is less than one penny. At those times, the difference in outcome between a 30 mils and 10 mils access fee would be a relatively large reduction in distortions.[1812] For stocks assigned to the half-penny tick that remain tick-constrained, the reductions would be more minor in an absolute sense (15 mils versus 10 mils). The analysis for potential conflicts of interest is similar.[1813] While the Commission acknowledges that there is some access fee that would be so low as to create strain on exchange business models, 10 mils appears well above this point.[1814] Like the adopted amendments, this alternative would not affect an exchange's ability to earn its baseline net

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1811 See supra section VII.D.2.d.

1812 See supra section VII.D.2.d. For stocks receiving the penny tick, the reduction in the access fee cap from 30 mils to 10 mils will reduce transaction costs for stocks that experience periods in which they are tick-constrained, and further reduce the probability that a stock becomes tick-constrained.

1813 See supra section VII.D.2.d

1814 See supra section VII.D.2.b

capture on trading volume priced greater than $1.00.[1815] This alternative may also result in complications for orders priced below $1. Specifically, for orders priced below $1 this alternative would lead to one of two outcomes that could have negative effects for stocks trading right at the $1.00 threshold. For these stocks, the minimum pricing increment is $0.0001 regardless of the access fee applied. If the fee cap for sub-$1 orders were to be kept proportional at 0.30% and 0.15% for trades priced above $1.00, then if those stocks prices drop below $1.00 this would result in a situation where there was a group of stocks with the same tick size (i.e., $0.0001) but two different fee caps. This could place stocks with the higher fee cap at a competitive disadvantage relative to the stocks with the lower access fee cap. This outcome is also more complicated than both the baseline and adopted rule which both have at most one fee cap per tick size. Alternatively, if the fee cap for orders priced below $1 were to be set uniformly at 0.30%, then this alternative would create a discontinuity in the cost of accessing liquidity at the $1.00 price threshold for stocks assigned the 15 mils fee cap; likewise, if the fee cap for orders priced below $1 were to be set uniformly at 0.15%, then it would create a discontinuity at the $1.00 price point for stocks with the 30 mil fee cap. This discontinuity could create distortions in liquidity provision as discussed in section VII.D.2.c.[1816] Consequently, this alternative results in either a situation in which there are two fee caps for the $0.0001 tick, or there exists a discontinuity in the cost of accessing liquidity at the $1 price point causing distortions in liquidity provision. Thus, this alternative appears to create costs without corresponding benefits.

[1815] See supra section VII.D.2.b

[1816] Specifically, see supra note 669, on the issue of discontinuities in the cost of accessing liquidity near the $1 threshold.

One commenter suggested the Commission plan to further study the question of access fee caps in combination with the change in the tick.[1817] For the reasons discussed above and elsewhere in this release, the Commission adopts the 10 mil access fee cap. Commission staff, however, will review and study the effects of the amendments as described in section VII.D.

b. Higher or Lower Uniform Access Fee Cap

The Commission could have adopted different uniform access fee caps. An access fee cap must stay below 50% of the minimum pricing increment in order to preserve price coherence.[1818] Alternatively, if the access fee cap is set below an exchanges' net capture rate, then it can adversely affect existing exchange pricing practices.[1819] Some commenters suggested retaining the current uniform 30 mils cap for stocks with prices above $1.00.[1820] A uniform 30 mils level would be above 50% of the minimum pricing increment under the adopted amendments, and thus would not preserve price coherence. Another commenter suggested a uniform access fee cap below 10 mils.[1821]

As discussed in section VII.D.2.b, exchanges have sufficient flexibility under the adopted amendments to maintain their current net-capture and agency business models on stocks with prices above $1. A uniform access fee higher than 10 mils would afford exchanges more

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1817 Nasdaq Letter IV at 11. This commenter recommended this alternative as phase 1 in a three-phase data gathering process where, in phase 2, the Commission would collect a year of data from phase 1's changes and then consider a further access fee cap reduction for stocks with a $0.005 tick. In phase 3, the Commission would collect an additional year of data to consider a lower fee cap for stocks with a $0.01 tick. Id. at 2 and 11.

1818 See supra section VII.D.2.a.

1819 If the access fee cap was set below an exchange's net capture rate, then its profitability would decrease because it would no longer be able to charge fees high enough to cover any non-negative rebate. To retain the same net capture rate, the exchange would have to charge a negative rebate (i.e., a fee), which would represent a major change in pricing model.

1820 See Citigroup Letter at 6, WFE Letter at 4.

1821 See IEX Letter IV at nn.14 and 21.

flexibility relative to the adopted amendments. For stocks with prices less than $1.00, an access fee percentage (of the share price) higher than the adopted 0.1% would imply, relative to the adopted amendments, a lower revenue loss on sub $1.00 trading.[1822] To illustrate with an example, if the access fee percentage were 0.15% instead of the adopted 0.10%, then exchanges' expected revenue loss on sub $1.00 trading would be approximatively $41 million across those exchanges charging the full 0.30% under the baseline, instead of approximatively $55 million under the adopted amendments.[1823] The main cost of an access fee cap above 10 mils would be to increase transaction costs for stocks with economic spreads smaller than the minimum pricing increment.[1824] Also, an access fee cap higher than 10 mils would allow for a greater wedge to exist between displayed prices and the net prices that are actually realized, potentially undermining price transparency.

In contrast, if the access fee caps were set below the adopted levels, then the effects described in the prior paragraph would all flip. Namely, relative to the adopted amendments, transaction costs for stocks with economic spreads smaller than the minimum pricing increment would be lower, and there could exist a smaller wedge between displayed prices and the net prices that are actually realized, potentially improving price transparency. However, relative to the adopted amendments, exchanges could no longer have sufficient flexibility to earn their net capture on stocks with prices above $1.00, and exchanges would incur a greater loss in revenue on sub $1.00 trading.

1822 See supra section VII.D.2.b for a discussion of lost revenue under the adopted amendments.

1823 See Table 14 in supra section VII.D.2.b. In that table, if the access fee percentage were 0.15% instead of the adopted 0.10% then the lost revenue on sub $1.00 trading would be approximatively $41 million across exchanges charging the full 0.30% under the baseline.

1824 For stocks with wider economic spreads, the higher access fee would most likely reduce the spread in equilibrium, implying little or no effect on transaction costs. See supra sections VII.B.3 and VII.D.2.c

An access fee cap higher than the adopted 10 mils, and the associated higher rebates, also exacerbates the potential conflict of interest for broker-dealers who route customers' orders to the exchanges. As discussed in section VII.D.3, fees and rebates introduce the potential for a conflict of interest if those fees and rebates are not fully passed through to the routing broker-dealers' customers. A higher access fee cap would increase the potential proceeds a broker-dealer would receive if it acted on the conflict of interest. A lower access fee cap would decrease the differences between the fees and rebates offered by different exchanges, which would decrease the potential proceeds a broker-dealer would receive if it acted on the conflict of interest.

Additionally, relative to the adopted amendments to Rule 610(c), a lower access fee cap could hinder an exchange's ability to differentiate itself from other exchanges on the basis of its pricing schedule, whereas a higher access fee cap could enable more differentiation. As discussed in section VII.E.2.b, the Commission expects that exchanges will continue to set fees and rebates at or near the access fee cap; therefore, a higher or lower access fee cap would likely have minimal effect on pricing differentiation across exchanges. For retail investors, an access fee cap different from the adopted levels would likely have little effect on retail market quality for reasons discussed earlier.[1825] With regard to exchange trading versus off-exchange trading, as discussed above,[1826] an access fee cap lower than the adopted level could bring more trading volume onto exchanges by further relieving tick constraints that drive volume off-exchange. A higher access fee cap would reverse these effects.

[1825] See supra note 1480 and surrounding text.

[1826] See supra section VII.E.2.b.

VIII. Paperwork Reduction Act

Certain provisions of the rules and rule amendments contain "collection of information requirements" within the meaning of the Paperwork Reduction Act of 1995 ("PRA").[1827] The Commission requested comment on the collection of information requirements in the Regulation NMS Proposal and submitted relevant information to the Office of Management and Budget ("OMB") for review in accordance with 44 U.S.C. 3507(d) and 5 CFR 1320.11. The title of the new collection of information is "Odd-Lot Information Acceleration." An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the agency displays a currently valid control number. The Commission has received an OMB control number (3235-0802) for this collection of information.

One commenter stated that the hourly rates for certain positions were inconsistent across the four proposals related to separate aspects of equity market structure and Regulation NMS.[1828] No other comments were received discussing the PRA. The hourly rates used to monetize burden hours differ across releases in order to account for changes in inflation rates. Consistent with this approach, the hourly rate figures discussed below have been updated from those cited in the Proposing Release to reflect recent inflation rates. In addition, certain estimates outlined in the MDI Adopting Release have been modified, as discussed in section VII.G below, to conform to the adopted amendments.

1827 44 U.S.C. 3501 et seq.

1828 See Data Boiler Letter I at 16 (identifying what it termed "inconsistent rates" for the Attorney and Compliance Manager positions).

A. Summary of Collection of Information

The rule amendments include a collection of information within the meaning of the PRA. Specifically, the amendments to Rule 603(b) require the exclusive SIPs to collect, consolidate, and disseminate odd-lot information, including the best odd-lot orders to buy and sell. The exclusive SIPs are also required to disseminate indicators of the applicable round lot size and minimum pricing increment for each NMS stock, both of which will be provided to the exclusive SIPs by the primary listing exchange.

B. Proposed Use of Information

The information collected under the amendments to Rule 603(b) will be consolidated and disseminated by the exclusive SIPs to market participants who will use this odd-lot information for trading. Widespread availability of odd-lot information promotes fair and efficient markets and facilitates the ability of brokers and dealers to trade more effectively and to provide best execution to their customers. The round lot and minimum pricing increment indicators that will be disseminated by the exclusive SIPs will provide market participants with information about the parameters for trading in a particular NMS stock.

C. Respondents

The collection of information under amended Rule 603(b) will apply to the two exclusive SIPs.

D. Total Annual Reporting and Recordkeeping Burden

1. Initial Burden Hours and Costs

The two exclusive SIPs will have to modify their systems to collect, consolidate, and disseminate the odd-lot information, including the best odd-lot orders to buy and sell, that they

do not currently collect, consolidate, and disseminate[1829] and to disseminate the round-lot and minimum pricing increment indicators provided by the primary listing exchange. These modifications will involve the addition of new hardware, network infrastructure, and bandwidth, as well as programming and development costs, to take in additional inbound odd-lot quotation messages from SROs, to calculate odd-lot information, and to consolidate and disseminate odd-lot information and the round lot and minimum pricing increment indicators to subscribers.

The Commission estimates that each exclusive SIP will incur 440 initial burden hours to modify its systems to collect, calculate, consolidate and disseminate odd-lot information and to disseminate the round-lot and minimum pricing increment indicators[1830] and initial external costs of $412,500 to purchase the necessary technology to effect such modifications.[1831] Thus, the

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1829 The exclusive SIPs currently disseminate odd-lot transaction data.

1830 The Commission estimates the monetized initial burden for this requirement to be $167,670, broken down as follows: [(Sr. Programmer at $399/hour for 210 hours) + (Sr. Systems Analyst at $343/hour for 180 hours) + (Compliance Manager at $373/hour for 20 hours) + (Director of Compliance at $588/hour for 10 hours) + (Compliance Attorney at $440/hour for 20 hours)] = 440 initial burden hours to modify its systems to comply with the requirement to collect, calculate, and disseminate odd-lot information. The Commission based these estimates on 10% of the initial burden hour estimates for each exclusive SIP to become a competing consolidator provided in the MDI Rules to account for the fact that these amendments do not require the exclusive SIPs to calculate and disseminate full consolidated market data (e.g., depth of book data or auction information) as defined in the MDI Rules. See MDI Adopting Release, supra note 10, at 18712-13. The Commission derived the hourly rate figures from SIFMA's Management & Professional Earnings in the Securities Industry 2013, modified to account for an 1,800-hour work-year and inflation, and multiplied by 5.35 to account for bonuses, firm size, employee benefits, and overhead.

1831 The Commission arrived at this estimate by dividing the initial external cost estimate provided in the MDI Rules for each exclusive SIP to become a competing consolidator by three to account for the fact that the exclusive SIPs would not need to build aggregation systems in three separate data centers to collect, calculate, and disseminate odd-lot information. See MDI Adopting Release, supra note 10, at 18712-13.

Commission estimates that the total initial burden hours for two exclusive SIPs will be 880 burden hours[1832] and that total initial external costs would be $825,000.[1833]

2. Ongoing Burden Hours and Costs

The Commission believes that the two exclusive SIPs will incur annual ongoing burden hours and external costs to operate and maintain their modified systems to collect, calculate, and disseminate odd-lot information and to disseminate the round-lot and minimum pricing increment indicators. The Commission estimates that each exclusive SIP will incur 132 ongoing, annual burden hours[1834] and ongoing, annual external costs of $123,725 to operate and maintain its systems to collect, calculate, and disseminate odd-lot information and to disseminate the round-lot and minimum pricing increment indicators.[1835] Thus, the Commission estimates that

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1832 The Commission estimates the monetized initial burden for this requirement to be $335,340, broken down as follows: [(Sr. Programmer at $399/hour for 210 hours) + (Sr. Systems Analyst at $343/hour for 180 hours) + (Compliance Manager at $373/hour for 20 hours) + (Director of Compliance at $588/hour for 10 hours) + (Compliance Attorney at $440/hour for 20 hours)] x [(2 exclusive SIPs)] = 880 total initial burden hours across the exclusive SIPs.

1833 The Commission estimates total initial external costs as follows: initial external costs of $412,500 per exclusive SIP x (2 exclusive SIPs) = $825,000.

1834 The Commission estimates the monetized annual ongoing burden for this requirement to be $50,301, broken down as follows: [(Sr. Programmer at $399/hour for 63 hours) + (Sr. Systems Analyst at $343/hour for 54 hours) + (Compliance Manager at $373/hour for 6 hours) + (Director of Compliance at $588/hour for 3 hours) + (Compliance Attorney at $440/hour for 6 hours)] = 132 ongoing, annual burden hours to operate and maintain its systems to comply with the requirement to collect, calculate, and disseminate odd-lot information. The Commission based these estimates on 10% of the ongoing, annual burden hour estimates provided in the MDI Rules for each exclusive SIP competing consolidator to operate and maintain its systems to comply with Rules 614(d)(1) through (4) to account for the fact that these amendments do not require the exclusive SIPs to calculate and disseminate full consolidated market data (e.g., depth of book data or auction information) as defined in the MDI Rules. See MDI Adopting Release, supra note 10, at 18712-13. The Commission derived the hourly rate figures from SIFMA's Management & Professional Earnings in the Securities Industry 2013, modified to account for an 1,800-hour work-year and inflation, and multiplied by 5.35 to account for bonuses, firm size, employee benefits, and overhead.

1835 The Commission arrived at this estimate by dividing by three the ongoing, annual external cost estimate provided in the MDI Rules for each exclusive SIP competing consolidator to operate and maintain its systems to comply with rules 614(d)(1) through (4) to account for the fact that the exclusive SIPs will not need to build aggregation systems in three separate data centers to collect, calculate, and disseminate odd-lot information. See MDI Adopting Release, supra note 10, at 18712-13.

the total ongoing, annual burden hours for two exclusive SIPs will be 264 burden hours[1836] and that total ongoing, annual external costs would be $247,450.[1837]

E. Collection of Information is Mandatory

The collection of information discussed above is a mandatory.

F. Confidentiality

This information collection will be public.

G. Revisions to Current MDI Rules Burden Estimates

Currently, the MDI Rules impose "collection of information" requirements within the meaning of the PRA. Specifically, pursuant to Rule 603(b), SROs are required to make available all data necessary to generate consolidated market data to competing consolidators and self-aggregators. As explained in more detail below, the Commission is revising the burden estimates associated with this requirement in light of the amendments. In the MDI Rules, the Commission estimated that each SRO will require an average of 220 initial burden hours of legal, compliance, information technology, and business operations personnel time to prepare and implement a system to collect the information necessary to generate consolidated market data (for a total cost per SRO of $70,865).[1838] The Commission estimated that each SRO would incur an annual

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1836 The Commission estimates the monetized annual ongoing burden for this requirement to be $100,602, broken down as follows: [(Sr. Programmer at $399/hour for 63 hours) + (Sr. Systems Analyst at $343/hour for 54 hours) + (Compliance Manager at $373/hour for 6 hours) + (Director of Compliance at $588/hour for 3 hours) + (Compliance Attorney at $440/hour for 6 hours) x (2 exclusive SIPs)] = 264 total ongoing, annual burden hours across the exclusive SIPs.

1837 The Commission estimates total annual ongoing external costs as follows: annual ongoing external costs of $123,725 per exclusive SIP x (2 exclusive SIPs) = $247,450.

1838 In the MDI Adopting Release, the Commission estimated the monetized initial burden for this requirement to be $70,865. The Commission derived this estimate based on per hour figures from SIFMA's Management & Professional Earnings in the Securities Industry 2013, modified to account for an 1,800-hour work-year and inflation, and multiplied by 5.35 to account for bonuses, firm size, employee benefits, and overhead: [(Compliance Manager at $310 for 105 hours) + (Attorney at $417 for 70 hours) + (Sr.

average burden on an ongoing basis of 396 hours to collect the information necessary to generate consolidated market data required by Rule 603(b) (for a total cost per SRO of $128,064).[1839]

As described above, the amendments to Rule 603(b) require SROs to make available all data necessary to generate odd-lot information to the exclusive SIPs whereas, under the decentralized consolidation model set forth in the MDI Rules, consolidated market data would be provided by competing consolidators and self-aggregators. The SROs already provide certain quotation information to the exclusive SIPs, and many SROs already provide odd-lot quotation information to customers through their proprietary data feeds.[1840] Nevertheless, providing the exclusive SIPs with the data necessary to generate odd-lot information may entail additional burdens. Specifically, technical development work may be needed to direct odd-lot quotations to the exclusive SIPs and to expand the capacity of the existing connections (including acquiring the necessary hardware, network capabilities and power) through which the SROs provide data to the exclusive SIPs to support the additional message traffic associated with odd-lot quotations. Therefore, the Commission is revising its burden estimates for Rule 603(b) upwards by 5% to account for the provision of the data necessary to generate odd-lot information to the exclusive

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Systems Analyst at $285 for 20 hours) + (Operations Specialist at $137 for 25 hours)] = 220 initial burden hours and $70,865.

1839 In the MDI Adopting Release, the Commission estimated the monetized ongoing, annual burden for this requirement to be $128,064. The Commission derived this estimate based on per hour figures from SIFMA's Management & Professional Earnings in the Securities Industry 2013, modified to account for an 1,800-hour work-year and inflation, and multiplied by 5.35 to account for bonuses, firm size, employee benefits, and overhead: [(Compliance Manager at $310 for 192 hours) + (Attorney at $417 for 48 hours) + (Sr. Systems Analyst at $285 for 96 hours)] = 336 initial burden hours and $128,064.

1840 See MDI Adopting Release, supra note 10, at 18599.

SIPs.[1841] Specifically, the Commission is adding 11 initial burden hours[1842] and 19.8 annual burden hours[1843] to its previous estimates.

In addition, the amendments require the primary listing exchange for each NMS stock to provide an indicator of the round lot size to the applicable exclusive SIP for dissemination and to calculate and provide to competing consolidators, self-aggregators, and the applicable exclusive SIP an indicator of the applicable minimum pricing increment for dissemination. The primary listing exchange is already required to calculate the applicable round lot size and provide it to competing consolidators and self-aggregators under the MDI Rules, and the incremental burden of providing this indicator to the two exclusive SIPs is likely to be minimal. However, calculating the applicable minimum pricing increment and providing it to competing consolidators, self-aggregators, and the exclusive SIPs will entail additional burdens.

Specifically, primary listing exchanges will need to program systems to calculate the applicable minimum pricing increment for each NMS stock that they list semiannually based on its TWAQS and to include this information in the data that they provide to competing

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1841 The Commission believes that 5% of the initial and ongoing, annual burden hour estimates provided in the MDI Rules for each SRO to make the data necessary to generate consolidated market data available to competing consolidators and self-aggregators is appropriate because the SROs already collect the data necessary to generate odd-lot information and this information is a subset of consolidated market data as defined in the MDI Rules.

1842 The Commission estimates the monetized initial burden for this requirement to be $4,261. The Commission derived this estimate based on per hour figures from SIFMA's Management & Professional Earnings in the Securities Industry 2013, modified to account for an 1,800-hour work-year and inflation, and multiplied by 5.35 to account for bonuses, firm size, employee benefits, and overhead: [(Compliance Manager at $373 for 5.25 hours) + (Attorney at $501 for 3.5 hours) + (Sr. Systems Analyst at $343 for 1 hour) + (Operations Specialist at $165 for 1.25 hours)] = 11 initial burden hours and $4,261.

1843 The Commission estimates the monetized ongoing, annual burden for this requirement to be $7,646.6. The Commission derived this estimate based on per hour figures from SIFMA's Management & Professional Earnings in the Securities Industry 2013, modified to account for an 1,800-hour work-year and inflation, and multiplied by 5.35 to account for bonuses, firm size, employee benefits, and overhead: [(Compliance Manager at $373 for 10.6 hours) + (Attorney at $501 for 3.4 hours) + (Sr. Systems Analyst at $343 for 5.8 hours)] = 19.8 annual burden hours and $7,646.6.

consolidators, self-aggregators, and the exclusive SIPs. Therefore, the Commission revising its burden estimates for Rule 603(b) upwards to account for the calculation of the applicable minimum pricing increment and the provision of this information to competing consolidators, self-aggregators, and the exclusive SIPs. Specifically, the Commission is adding 50 initial burden hours[1844] and 32 annual burden hours[1845] for each primary listing exchange to its previous estimates and 250 total initial burden hours[1846] and 160 total annual burden hours[1847] for five primary listing exchanges.

In addition, the MDI Rules include a collection of information requirement under rules 614(d)(1) through (3), which require competing consolidators to collect from the SROs quotation and transaction information for NMS stocks, calculate and generate a consolidated market data product, and make the consolidated market data product available to subscribers.[1848] As discussed above, the amended definition of odd-lot information includes a specified best odd-lot order to buy and best odd-lot order to sell. Since the odd-lot quotes that a competing consolidator would use to identify and disseminate the best odd-lot orders—if the competing consolidator

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1844 The Commission estimates the monetized initial burden for this requirement to be $19,000 per primary listing exchange. Salaries are derived from SIFMA's Management & Professional Earnings in the Securities Industry 2013, modified to account for an 1,800-hour work-year and inflation, and multiplied by 5.35 to account for bonuses, firm size, employee benefits and overhead: [(Sr. Programmer at $368 for 25 hours) + (Sr. Systems Analyst at $316 for 10 hours) + (Compliance Manager at $344 for 10 hours) + (Director of Compliance at $542 for 5 hour)] ≈ $19,000 per listing exchange). See supra notes 1644-1645 and accompanying text.

1845 The Commission estimates the monetized ongoing, annual burden for this requirement to be $9,000 per primary listing exchange. ((Compliance Attorney at $406 for 6 hours) + (Compliance Manager at $344 for 2 hours)) x 4 tick size revisions per year] ≈ $9,000 per listing exchange. Id.

1846 50 initial burden hours per primary listing exchange x 5 primary listing exchanges = 250 total initial burden hours. The Commission estimates the total monetized initial burden of this requirement to be $95,000 ($19,000 per primary listing exchange x 5 primary listing exchanges = $95,000). Id.

1847 32 annual burden hours per primary listing exchange x 5 primary listing exchanges = 160 total annual burden hours. The Commission estimates the total monetized annual burden of this requirement to be $45,000 ($9,000 per primary listing exchange x 5 primary listing exchanges = $45,000). Id.

1848 MDI Adopting Release, supra note 10, at 18703.

offers a consolidated market data product that includes this information—are already included in the data necessary to generate odd-lot information, the Commission believes that the existing burden estimates for rules 614(d)(1) through (3) account for the identification and dissemination of the best odd-lot orders.

IX. Regulatory Flexibility Act

The Regulatory Flexibility Act ("RFA") requires the Commission, in promulgating rules,[1849] to consider the impact of those rules on small entities. This Final Regulatory Flexibility Analysis has been prepared in accordance with section 604 of the RFA.[1850] The Commission prepared an Initial Regulatory Flexibility Analysis and a Regulatory Flexibility Act certification in accordance with the RFA and included in the Proposing Release.[1851]

In the Proposing Release, the Commission certified that the proposed amendments to Rules 600, 603 and 610 would not have a significant economic impact on a substantial number of small entities for purposes of the RFA.[1852] The Proposing Release solicited comments on the certification. The Commission received no comments on this certification.

With respect to Rule 612, an initial Regulatory Flexibility Analysis ("IFRA") was prepared in accordance with the RFA and was included in the Proposing Release. [1853] The Commission has prepared this Final Regulatory Flexibility Analysis ("FRFA") in accordance with section 604 of the RFA.[1854] The Commission did not receive comments on the IRFA.

1849 5 U.S.C. 553.

1850 See 5 U.S.C. 604.6.

1851 See section VIII of the Proposing Release, supra note 11.

1852 See supra id.

1853 See section VIII of the Proposing Release, supra note 11. See supra section VII.B.

1854 5 U.S.C. 604.

A. Amendments to Rule 612 – Final Regulatory Flexibility Analysis

1. Reasons for the Action

As discussed in section III, the Commission is adopting amendments to Rule 612 to update and modernize the rule for the current trading environment. As adopted, Rule 612 will reduce minimum pricing increment for orders and quotes priced $1.00 or greater for certain NMS stocks.

2. Small Entities Subject to the Rule

Rule 612 would apply to national securities exchanges, national securities associations, ATSs, vendors, and broker or dealers.

National securities exchanges are not small entities as defined by Commission rules. Exchange Act rule 0-10(e)[1855] states that the term "small business" when referring to an exchange means any exchange that has been exempted from the reporting requirements of Exchange Act rule 601 and is not affiliated with any person that is not a small business or small organization. There is only one national securities association, and the Commission has previously stated that it is not a small entity as defined by 13 CFR 121.201.[1856]

Commission rule 0-10(c) defines a broker-dealer as a small entity for the purpose of this section if the broker-dealer had a total capital (net worth plus subordinated liabilities) of less than $500,000 on the date in the prior fiscal year as of which its audited financial statements were prepared, had less than $200 million of funds and securities in its custody of control at all times

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[1855] 17 CFR 240.0-10(e).

[1856] See Securities Exchange Act Release No. 62174 (May 26, 2010), 75 FR 32556 (June 8, 2010) ("FINRA is not a small entity as defined by 13 CFR 121.201.").

during the preceding fiscal year, and the broker-dealer is not affiliated with any person (other than a natural person) that is not a small entity.[1857] The Commission is updating the estimate from the Proposing Release and estimates that as of December 31, 2023, there were approximately 734 Commission registered broker-dealers that would be small entities for purposes of the statute that would be required to comply with the amendments to Rule 612 regarding quotation in the minimum pricing increments.[1858] The updated estimate number is approximately 3.5% lower and does not impact the Commission's analysis.

Rule 612 applies to NMS stocks and the rule would apply to NMS Stock ATSs. NMS Stock ATSs that are not registered as exchanges are required to register as broker-dealers.[1859] Accordingly, NMS Stock ATSs would be considered small entities if they fall within the standard for small entities that would apply to broker-dealers. The Commission examined FOCUS data for the 33 broker-dealers that currently operate NMS Stock ATSs and, applying the test for broker-dealers described above, believes that none of the NMS Stock ATSs currently trading NMS stocks were operated by a broker-dealer that is a "small entity."[1860]

A vendor is defined in rule 600(b)(100) of Regulation NMS as any SIP engaged in the business of disseminating transaction reports, last sale data, or quotations with respect to NMS securities to brokers, dealers, or investors on a real-time or other current and continuing basis, whether through an electronic communications network, moving ticker, or interrogation

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1857 17 CFR 240.0-10(c).

1858 In the Proposing Release, the Commission estimated that as of June 30, 2022, there were approximately 761 Commission registered broker-dealers that would be small entities for purposes of the statute.

1859 See rule 301(b)(1) of Regulation ATS.

1860 A list of NMS Stock ATSs with Form ATS on file with the Commission is available at https://www.sec.gov/about/divisions-offices/division-trading-markets/alternative-trading-systems/form-ats-n-filings-information#ats-n. The Commission examined the list as of January 31, 2024. The number of broker-dealers that operate NMS Stock ATSs has not changed from the Proposing Release.

device.[1861] Commission rule 0-10(g) states that the term small business when referring to a SIP, means any SIP that had gross revenues of less than $10 million during the preceding year, provided service to fewer than 100 interrogation devices or moving tickers at all times during the preceding year, and is not affiliated with any person that is not a small business or small organization.[1862] The Commission estimates as of August 31, 2022, that there are approximately 80 vendors, 13 of which would be small entities.

3. Reporting, Recordkeeping, and Other Compliance Requirements

Rule 612 will no impose any new reporting, recordkeeping, or other compliance requirements on market participants that are small entities.

4. Significant Alternatives

Pursuant to section 3 of the RFA, the Commission must consider the following types of alternatives: (a) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (b) the clarification, consolidation, or simplification of compliance and reporting requirements under the proposed rule for small entities; (c) the use of performance rather than design standards; and (d) an exemption from coverage of the proposed rule, or any part thereof, for small entities.

The primary goal of Rule 612 is to provide uniform minimum pricing increments for NMS stocks. This primary goal continues with the amendments to Rule 612. As such, imposing different compliance or reporting requirements or possibly a different timetable for implementing compliance or reporting requirements, for small entities, could undermine the goal of uniformity. In addition, the Commission has concluded similarly that it would not be

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1861 See 17 CFR 242.600(b)(100).

1862 See 17 CFR 242.0-10(g).

consistent with the primary goal to further clarify, consolidate, or simplify the amendments to Rule 612 for small entities. The amendments to Rule 612 are performance standards and do not dictate for entities of any size any particular design standards, e.g., technology, that must be employed to achieve the objectives of the rule. It would be inconsistent with the purposes of the Exchange Act to specify different requirements for small entities or to exempt broker-dealers from the amendments to Rule 612.

B. Amendments to Rule 610

The changes to Rule 610(c) would apply to trading centers as defined in rule 600(b)(95) that impose fees for access against a protected quotation or any other quotation of the trading center that is the best bid or best offer of a national securities exchange or national securities association. As discussed above, currently national securities exchanges are the only trading centers publishing protected quotations. Pursuant to rule 0-10(e), none of the national securities exchanges are small entities for purposes of the RFA.[1863]

New Rule 610(d) will require all fees charged and rebates paid by national securities exchanges to be determinable at the time of execution. Pursuant to rule 1-10(e), none of the national securities exchanges are small entities for purposes of the RFA.[1864]

C. Amendments to Rule 603 and Definitions Odd-Lot Information and Regulatory Data Under Rule 600

The amendments to Rule 603(b) and to the definitions of odd-lot information and regulatory data in rule 600(b) would apply to national securities exchanges registered with the Commission under section 6 of the Exchange Act, national securities associations registered with

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1863 See 17 CFR 240.0-10(e).

1864 Id.

the Commission under section 15A of the Exchange Act, and the exclusive SIPs. As stated above, pursuant to rule 0-10(e), none of the national securities exchanges small entities for the purposes of the RFA.[1865] There is one national securities association, and the Commission has previously stated that it is not a small entity.[1866] With respect to the exclusive SIPs, neither SIAC nor Nasdaq meet the criteria for a "small business" or "small organization" when used with reference to a securities information processor.[1867] Thus the amendments to rules 600(b) and 603(b) would not affect any small entities. For the purposes of the RFA, the Commission certifies that the amendments to Rule 603(b) and rule 600(b) would not have a significant economic impact on a substantial number of small entities.

D. Certification

For the reasons described above, the Commission certifies that the final amendments to Rules 600, 603(b) and 610 would not have a significant economic impact on a substantial number of small entities for purposes of the RFA.

X. Other Matters

Pursuant to the Congressional Review Act,[1868] the Office of Information and Regulatory Affairs has designated these rules as a "major rule" as defined by 5 U.S.C. 804(2). The Commission considers the provisions of the final amendments to be severable to the fullest extent permitted by law. "If parts of a regulation are invalid and other parts are not," courts "set aside only the invalid parts unless the remaining ones cannot operate by themselves or unless the

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1865 See 17 CFR 240.0-10(e).

1866 See supra note 1856.

1867 See 17 CFR 240.0-10(g). See also Securities Exchange Act Release No. 61595 (Feb. 26, 2010), 75 FR 11232, 11320 (Mar. 10, 2010) (determining that SIAC and Nasdaq are not small entities for purposes of the RFA).

1868 5 U.S.C. 801 *et seq.*

agency manifests an intent for the entire package to rise or fall together." Bd. of Cnty. Commissioners of Weld Cnty. v. EPA, 72 F.4th 284, 296 (D.C. Cir. 2023); see K mart Corp. v. Cartier, Inc., 486 U.S. 281, 294 (1988). "In such an inquiry, the presumption is always in favor of severability." Cmty. for Creative Non-Violence v. Turner, 893 F.2d 1387, 1394 (D.C. Cir. 1990). Consistent with these principles, while the Commission believes that all provisions of the final amendments are fully consistent with governing law, if any of the provisions of these amendments, or the application thereof to any person or circumstance, is held to be invalid, the Commission intends that such invalidity shall not affect other provisions or application of such provisions to other persons or circumstances that can be given effect without the invalid provision or application. In particular, the amendments relating to round lots, odd-lot information, Rule 610(c), and Rule 610(d) can operate independently from each other and from the amendments related to Rule 612. Additionally, the amendments to Rule 612 can operate independently from the amendments relating to round lots, odd-lot information, and Rule 610(d).

Statutory Authority and Text of Rule Amendments

Pursuant to the Exchange Act, and particularly sections 2, 3(b), 5, 6, 11, 11A, 15, 15A, 17, 19, 23(a), and 36 thereof, 15 U.S.C. 78b, 78c, 78e, 78f, 78k, 78k-1, 78*o*, 78*o*-3, 78q, 78s, 78w(a), and 78mm the Commission is amending sections 242.600, 242.603, 242.610, and 242.612 of chapter II of title 17 of the Code of Federal Regulations.

List of Subjects in 17 CFR Part 242

Regulations M, SHO, ATS, AC, NMS, and SBSR and Customer Margin Requirements for Security Futures.

For the reasons stated in the preamble, the Commission is amending title 17, chapter II of the Code of Federal Regulations as follows:

PART 242 – REGULATIONS M, SHO, ATS, AC, NMS, AND SBSR AND CUSTOMER MARGIN REQUIREMENTS FOR SECURITY FUTURES

1. The authority citation for part 242 continues to read as follows:

Authority: 15 U.S.C. 77g, 77q(a), 77s(a), 78b, 78c, 78c-4, 78g(c)(2), 78i(a), 78j, 78k-1(c), 78*l,* 78m, 78n, 78*o*(b), 78*o*(c), 78*o*(g), 78q(a), 78q(b), 78q(h), 78w(a), 78dd-1, 78mm, 80a-23, 80a-29, 80a-37, and 8343.

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2. Amend §242.600 paragraph (b) by:

a. Removing in paragraph (69)(i) the text "and" from the end of the paragraph;

b. Adding in paragraph (69)(ii) the text "and" to the end of the paragraph;

c. Adding paragraph (69)(iii);

d. Removing in paragraph (89)(i)(D) the text "and" from the end of the paragraph;

e. Removing in paragraph (89)(i)(E) the period from the end of the paragraph and adding the text "; and" in its place;

f. Adding paragraphs (89)(i)(F) and (89)(iv);

g. Revising paragraph (93)(i);

h. Adding new paragraphs (93)(i)(A), (i)(B), (i)(C), and (i)(D);

i. Redesignating paragraphs (93)(ii), (iii), (iv) as paragraphs (93)(i)(B), (i)(C), (i)(D), respectively, and removing from these paragraphs the text "For any NMS stock for which the prior calendar month's average closing price on the primary listing exchange was";

j. Redesignating paragraph (93)(v) as paragraph (93)(ii) and revising paragraph (93)(ii);

k. Revising paragraph (93)(iii);

l. Revising paragraph (93)(iv).

The additions and revisions read as follows:

§242.600 NMS security designation and definitions.

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(b) * * *

(69) * * *

(iii) *Best odd-lot order to buy and best odd-lot order to sell.* The best odd-lot order to buy means the highest priced odd-lot order to buy that is priced higher than the national best bid, and the best odd-lot order to sell means the lowest priced odd-lot order to sell that is priced lower than the national best offer, for an NMS stock that are calculated and disseminated on a current and continuing basis by a competing consolidator or plan processor or calculated by a self-aggregator; provided, that in the event two or more market centers transmit to a competing consolidator, plan processor, or a self-aggregator identical odd-lot buy orders or odd-lot sell orders for an NMS stock, the highest priced odd-lot buy order or lowest priced odd-lot sell order (as the case may be) shall be determined by ranking all such identical odd-lot buy orders or odd-lot sell orders (as the case may be) first by size (giving the highest ranking to the odd-lot buy order or odd-lot sell order associated with the largest size), and then by time (giving the highest ranking to the odd-lot buy order or odd-lot sell order received first in time).

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(89) * * *

(i) * * *

(F) An indicator of the applicable minimum pricing increment required under §242.612.

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(iv) The primary listing exchange shall also provide the information required under paragraphs (b)(89)(i)(E) and (F) of this section to the applicable plan processor for dissemination.

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(93) * * *

(i) For any NMS stock for which the average closing price on the primary listing exchange during the prior Evaluation Period was:

(A) $250.00 or less per share, an order for the purchase or sale of an NMS stock of 100 shares;

(B) $250.01 to $1,000.00 per share, an order for the purchase or sale of an NMS stock of 40 shares;

(C) $1,000.01 to $10,000.00 per share, an order for the purchase or sale of an NMS stock of 10 shares;

(D) $10,000.01 or more per share, an order for the purchase or sale of an NMS stock of 1 share; and

(ii) *New NMS stocks*. Any security that becomes an NMS stock during an operative period as described in paragraph (iv) of this section shall be assigned a round lot of 100 shares.

(iii) For purposes of this section only, the Evaluation Period means (A) all trading days in March for the round lot assigned on the first business day of May and (B) all trading days in September for the round lot assigned on the first business day of November during which the average closing price of an NMS stock on the primary listing exchange shall be measured by the primary listing exchange to determine the round lot for each NMS stock.

(iv) The round lot assigned under this section shall be operative on (A) the first business day of May for the March Evaluation Period and continue through the last business day of October of the calendar year, and (B) the first business day of November for the September Evaluation Period and continue through the last business day of April of the next calendar year.

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3. Amend §242.603 by revising the section heading and paragraph (b) to read as follows:

§242.603. Distribution, consolidation, dissemination, and display of information with respect to quotations for and transactions in NMS stocks

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(b) *Consolidation and dissemination of information.*

(1) Application of paragraphs (b)(2) and (3) of this section:

(i) Compliance with paragraph (b)(3) of this section is required until the date indicated by the Commission in any order approving amendments to the effective national market system plan(s) to effectuate a cessation of the operations of the plan processors that disseminate consolidated information regarding NMS stocks.

(ii) Compliance with paragraph (b)(2) of this section is required 180 calendar days from the date of the Commission's approval of the amendments, filed as required under §242.614(e), to the effective national market system plan(s).

(2) Every national securities exchange on which an NMS stock is traded and national securities association shall act jointly pursuant to one or more effective national market system plans for the dissemination of consolidated market data. Every national securities exchange on which an NMS stock is traded and national securities association shall make available to all competing consolidators and self-aggregators its information with respect to quotations for and

transactions in NMS stocks, including all data necessary to generate consolidated market data, in the same manner and using the same methods, including all methods of access and the same format, as such national securities exchange or national securities association makes available any information with respect to quotations for and transactions in NMS stocks to any person.

(3) Every national securities exchange on which an NMS stock is traded and national securities association shall act jointly pursuant to one or more effective national market system plans to disseminate consolidated information, including a national best bid and national best offer and odd-lot information, on quotations for and transactions in NMS stocks. Such plan or plans shall provide for the dissemination of all consolidated information for an individual NMS stock through a single plan processor and such single plan processor must represent quotation sizes in such consolidated information in terms of the number of shares, rounded down to the nearest multiple of a round lot. Every national securities exchange on which an NMS stock is traded and national securities association shall make available to a plan processor all data necessary to generate odd-lot information.

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4. Amend §242.610 by:

a. Revising paragraph (c);

b. Redesignating paragraphs (d) and (e) as (e) and (f); and

c. Adding new paragraph (d).

The revisions and additions read as follows:

§242.610 Access to quotations.

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(c) *Fees for access to quotations.* A trading center shall not impose, nor permit to be imposed, any fee or fees for the execution of an order against a protected quotation of the trading center or against any other quotation of the trading center that is the best bid or best offer of a national securities exchange or the best bid or best offer of a national securities association in an NMS stock that exceed or accumulate to more than the following limits:

(1) If the price of a protected quotation or other quotation is $1.00 or more, the fee or fees cannot exceed or accumulate to more than $0.001 per share; or

(2) If the price of a protected quotation or other quotation is less than $1.00, the fee or fees cannot exceed or accumulate to more than 0.1% of the quotation price per share.

(d) *Transparency of fees.* A national securities exchange shall not impose, nor permit to be imposed, any fee or fees, or provide, or permit to be provided, any rebate or other remuneration, for the execution of an order in an NMS stock that cannot be determined at the time of execution.

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5. Revise § 242.612 to read as follows:

§242.612 Minimum pricing increment.

(a) *Definitions.* For purposes of this rule only, the following terms shall have the meanings set forth in this rule.

(1) Evaluation Period means:

(i) The three months from January through March of a calendar year and

(ii) The three months from July through September of a calendar year during which the Time Weighted Average Quoted Spread of an NMS stock shall be measured by the primary listing exchange to determine the minimum pricing increment for each NMS stock.

(2) Time Weighted Average Quoted Spread means the average dollar value difference between the NBB and NBO during regular trading hours where each instance of a unique NBB and NBO is weighted by the length of time that the quote prevailed as the NBB or NBO.

(b) *Minimum pricing increments.*

(1) The minimum pricing increment under paragraph (2) of this section shall be operative on:

(a) The first business day of May for the Evaluation Period from January through March and continue through the last business day of October of the calendar year, and

(b) The first business day of November for the Evaluation Period from July through September and continue through the last business day of April of the next calendar year.

(2) No national securities exchange, national securities association, alternative trading system, vendor, or broker or dealer shall display, rank, or accept from any person a bid or offer, an order, or an indication of interest in any NMS stock in an increment smaller than required pursuant to either paragraph (i) or (ii) below if that bid or offer, order, or indication of interest is priced equal to or greater than $1.00 per share:

(i) $0.01, if the Time Weighted Average Quoted Spread for the NMS stock during the Evaluation Period was greater than, $0.015; or

(ii) $0.005, if the Time Weighted Average Quoted Spread for the NMS stock during the Evaluation Period was equal to or less than $0.015.

(3) No national securities exchange, national securities association, alternative trading system, vendor, or broker or dealer shall display, rank, or accept from any person a bid or offer, an order, or an indication of interest in any NMS stock priced in an increment smaller than $0.0001 if that bid or offer, order, or indication of interest is priced less than $1.00 per share.

(c) *New NMS Stocks*. Any security that becomes an NMS Stock during an operative period as described in paragraph (b)(1) of this section shall be assigned a minimum pricing increment of $0.01 for bids or offers, orders, or indications of interest priced equal to or greater than $1.00 per share.

(d) *Exemptions.* The Commission, by order, may exempt from the provisions of this section, either unconditionally or on specified terms and conditions, any person, security, quotation, or order, or any class or classes of persons, securities, quotations, or orders, if the Commission determines that such exemption is necessary or appropriate in the public interest, and is consistent with the protection of investors.

By the Commission.

Dated: September 18, 2024

Vanessa A. Countryman,

Secretary.