

# Michigan Business & Entrepreneurial Law Review

---

Volume 10 | Issue 1

---

2021

## Equity Market Structure Regulation: Time to Start Over

Paul G. Mahoney

*University of Virginia School of Law*

Follow this and additional works at: <https://repository.law.umich.edu/mbelr>



Part of the [Administrative Law Commons](#), and the [Securities Law Commons](#)

---

### Recommended Citation

Paul G. Mahoney, *Equity Market Structure Regulation: Time to Start Over*, 10 MICH. BUS. & ENTREPRENEURIAL L. REV. 1 (2020).

Available at: <https://repository.law.umich.edu/mbelr/vol10/iss1/2>

<https://doi.org/10.36639/mbelr.10.1.equity>

This Article is brought to you for free and open access by the Journals at University of Michigan Law School Scholarship Repository. It has been accepted for inclusion in Michigan Business & Entrepreneurial Law Review by an authorized editor of University of Michigan Law School Scholarship Repository. For more information, please contact [mlaw.repository@umich.edu](mailto:mlaw.repository@umich.edu).

# EQUITY MARKET STRUCTURE REGULATION: TIME TO START OVER

Paul G. Mahoney\*

## ABSTRACT

*Over the past half century, the U.S. Securities and Exchange Commission (SEC)'s regulations have become key determinants of the way in which stocks trade and the fees that exchanges charge for their services. The current equity market structure rules are contained primarily in the SEC's Regulation NMS. The theory behind Regulation NMS is that a system of dispersed markets operating pursuant to SEC-mandated information and order routing links will provide the benefits of consolidation and competition simultaneously.*

*This article argues that Regulation NMS has failed in that quest. It has produced fragmented markets and created questionable incentives for market participants, possibly producing socially excessive investments in trading speed and secrecy. It also discourages exchange innovation, provides insufficient incentives for traders to price orders aggressively, requires brokers to act against their customers' interests, and forces the SEC to act as a price regulator.*

*The article contends that the SEC should replace Regulation NMS with three simple design principles—issuer choice, exchange autonomy, and regulatory consistency. These would allow market forces, rather than regulatory mandates, to determine the design and pricing of trading platforms and the trading strategies of broker-dealers. They would better align the private incentives of trading platforms with the social objectives of improving liquidity and price discovery.*

## TABLE OF CONTENTS

I. INTRODUCTION .....	2
II. THE EVOLUTION OF EQUITY MARKET STRUCTURE REGULATION .....	5
A. <i>From the New Deal to the Securities Acts Amendments</i> .....	5
B. <i>The Securities Acts Amendments of 1975 and the birth of the NMS</i> .....	8
C. <i>From the 1975 Amendments to Regulation NMS</i> .....	15
III. DRAWBACKS OF REGULATION NMS .....	20
A. <i>Regulation NMS and Market Fragmentation</i> .....	20

---

\* David and Mary Harrison Distinguished Professor, University of Virginia School of Law. I thank Yakov Amihud, Peter Conti-Brown, Kevin Douglas, Lawrence Glostén, Joseph Grundfest, Bruce Johnsen, Gabriel Rauterberg, and seminar participants at George Mason University Antonin Scalia Law School and The Wharton School of the University of Pennsylvania for helpful comments.

B. *Regulation NMS Creates Questionable Incentives for Trading Centers and Professional Traders*.....22

C. *Regulation NMS Discourages Innovation in Trading System Design* .....26

D. *Compared to a Consolidated Market, Regulation NMS Discourages Aggressive Orders*.....29

E. *Regulation NMS Interferes with Brokers’ Efforts to Serve Their Customers’ Interests* .....30

F. *Regulation NMS Makes the SEC a Public Utility Regulator, a Task for Which it is Poorly Suited*.....31

    1. *Data Fees*.....31

    2. *Access Fees*.....35

G. *So What?* .....36

IV. *MOVING FORWARD*.....38

    A. *Issuer Choice*.....38

    B. *Exchange Autonomy*.....40

    C. *Regulatory Consistency*.....41

    D. *Can We Get There from Here?*.....42

V. *CONCLUSION*.....44

I. INTRODUCTION

A typical large-company stock may trade simultaneously on more than a dozen regulated exchanges, on electronic markets regulated as broker-dealers, and through dealers transacting outside the organized markets.<sup>1</sup> This fragmented structure arose in part because technology enabled investors and intermediaries to design new solutions to traditional trading challenges.<sup>2</sup> It also arose in part because Congress and the SEC made regulatory choices that encouraged the proliferation of trading markets and the resulting fragmentation of trading.<sup>3</sup>

These choices were not the result of a comprehensive design process. Regulators responded to problems and ideas as they arose. The regulatory evolution culminated with the SEC’s adoption of Regulation NMS in 2005.<sup>4</sup> Regulation NMS and related market structure rules embody three design principles. First,

1. See Ryan J. Davies & Erik R. Sirri, *The Economics of Trading Markets*, in *SECURITIES MARKET ISSUES FOR THE 21<sup>ST</sup> CENTURY* 145, 154 (Merritt B. Fox et al. eds., 2018).

2. See James J. Angel, Lawrence E. Harris & Chester S. Spatt, *Equity Trading in the 21st Century*, 1 Q. J. FIN. 1, 2–3 (2011) (“[I]nvestor demands for better solutions to the trading problems that they have traditionally faced—and will always face—largely drove the innovations.”).

3. See, e.g., Daniel Gallagher, *How to Reform Equity Market Structure: Eliminate “Reg NMS” and Build Venture Exchanges*, HERITAGE FOUND. (2017), <https://www.heritage.org/article/how-reform-equity-market-structure-eliminate-reg-nms-and-build-venture-exchanges> (“[I]n recent years, changes to the structure of these markets have been driven as much, if not more, by legislative and regulatory action than by the private sector . . . .”); Merritt B. Fox, Lawrence R. Glosten & Gabriel V. Rauterberg, *The New Stock Market: Sense and Nonsense*, 65 DUKE L.J. 191, 199–200 (2015); *infra* Part III.

4. See *infra* Part II.C.

exchanges must facilitate brokers' search for the best price by providing its "top of book," or best-priced quotations, to a central processor that sells data at a collectively determined price subject to SEC regulation. Second, trading centers may not execute a trade at a price inferior to the best price displayed by the central processor. Third, any exchange may trade any public company stock.

The underlying logic of this design is that a system of separate but linked markets should provide the best of all worlds. Consolidating trading on a single market may improve liquidity and price discovery but facilitate monopoly pricing for access to quotations or trade execution. Fragmenting trading among competing markets reduces pricing power, but possibly at the expense of liquidity and price discovery. The SEC believed that its separate-but-linked markets paradigm would avoid these tradeoffs.<sup>5</sup>

In this article, I argue that experience has not borne out the logic. Although exchanges proliferated following the adoption of Regulation NMS, the resulting structure is less competitive and less innovative than the sheer number of venues might suggest. All thirteen exchanges use the same market design.<sup>6</sup> The proliferation of exchanges encourages investments in speed and secrecy that may be excessive from a societal perspective. It also dulls traders' incentives to bid aggressively against one another rather than free riding on others' price information. Regulation NMS requires brokers to sometimes act against their customers' best interests. It has put the SEC in the position of a price regulator, a task to which it is not well-suited.

The Treasury Department and the SEC's Chair and Director of the Division of Trading and Markets have suggested various incremental revisions to Regulation NMS to address some of these concerns.<sup>7</sup> In October 2019, the SEC issued a public statement inviting exchanges to propose improvements in market structure for thinly-traded companies, which could include exemptive relief from Regulation NMS and from unlisted trading.<sup>8</sup> In early 2020, it proposed that the exchanges revise the governance of the Equity Data Plans through which the exchanges comply with their regulatory obligation to provide price

---

5. See Regulation NMS, Exchange Act Release No. 51,808, 70 Fed. Reg. 37,496, 37,499 (June 29, 2005) (noting that the SEC's objective is to further "the distinct, but equally vital, benefits associated with both competition among markets and competition among orders").

6. See Eric Budish, Robin S. Lee & John J. Shim, *A Theory of Stock Exchange Competition and Innovation: Will the Market Fix the Market?* 1, 4 (Becker Friedman Inst. for Econ. Uni. of Chi., Working Paper No. 2019-72, 2020).

7. See Press Release, Steven T. Mnuchin, Sec'y, & Craig S. Phillips, Couns. to the Sec'y, Dep't of the Treasury, *A Financial System That Creates Economic Opportunities: Capital Markets* (Oct. 2017), <https://www.treasury.gov/press-center/press-releases/Documents/A-Financial-System-Capital-Markets-FINAL-FINAL.pdf> [hereinafter Treasury Press Release]; see also Jay Clayton, Chairman, U.S. Sec. & Exch. Comm'n & Brett Redfearn, Div. of Trading & Mrkts. Dir., U.S. Sec. & Exch. Comm'n, *Equity Market Structure 2019: Looking Back & Moving Forward*, Remarks at Fordham University Gabelli School of Business (Mar. 8, 2019), [https://www.sec.gov/news/speech/clayton-redfearn-equity-market-structure-2019#\\_ftn2](https://www.sec.gov/news/speech/clayton-redfearn-equity-market-structure-2019#_ftn2).

8. See *Market Structure Innovation for Thinly Traded Securities*, Exchange Act Release No. 87,327, 84 Fed. Reg. 56,956, 56,957 (October 24, 2019).

and quotation data to a consolidated processor.<sup>9</sup> More recently, it ordered the exchanges to consolidate and revise the governance of the Equity Data Plans.<sup>10</sup> These proposals largely deal with the unintended consequences of Regulation NMS as it was originally crafted.

This article advocates for a more fundamental rethinking of market structure regulation. Regulation NMS should be scrapped and replaced with three alternative design principles: issuer choice, exchange autonomy, and regulatory consistency.

Issuers, not exchanges, should decide where their shares trade. There is no universally accepted answer to the question of whether welfare is maximized by centralizing all trading in a given stock on a single platform or allowing it to trade on competing platforms. Public companies should be free to centralize trading on a single exchange, spread it over all available platforms, or select something in between. Those choices may reveal an optimal structure or show that the best structure is a function of issuer characteristics.

Exchanges, not the SEC, should design their trading environments and the terms of access to their quotations. Brokers, not exchanges, should be responsible for processing information and deciding which trading venue offers the best available execution. Technology has made it possible to search multiple trading platforms in a matter of milliseconds. Brokers' reputational interest and legal obligation to seek the best execution for their customers provide the incentive to engage in that search.

The current system for regulating trading platforms distinguishes between exchanges, which regulate their member brokers and listed companies, and alternative trading systems (ATS), which do not. Unlike an exchange, an ATS need not display its quotations publicly unless it accounts for more than five percent of trading in the relevant stock, which none currently does.<sup>11</sup> The distinction made sense in an era before Congress and the SEC had so thoroughly occupied the fields of public company disclosure and governance and broker misconduct.<sup>12</sup> Given the current regulatory framework for public companies

---

9. See Market Data Infrastructure, Exchange Act Release No. 88,216, 85 Fed. Reg. 16,726 (Mar. 24, 2020); see also Jay Clayton, Chairman, U.S. Sec. & Exch. Comm'n, Statement at Open Meeting on Proposed Order to Modernize the Governance Structure of National Market System Plans for Equity Market Data (Jan. 8, 2020), <https://www.sec.gov/news/public-statement/statement-clayton-open-meeting-2020-01-08> (citing "conflicts of interest between the exchanges' commercial objectives, on the one hand, and their regulatory obligations" as part of the motivation for the proposal).

10. See New National Market System Plan Regarding Consolidated Equity Market Data, Exchange Act Release No. 88,827, 85 Fed. Reg. 28,702 (May 13, 2020).

11. See Gabriel Rauterberg, *Innovation in the Stock Market and Alternative Trading Systems*, FIN. MRKT. INFRASTRUCTURES: L. & REGUL. (Jens-Hinrich Binder & Paolo Saguato eds., forthcoming 2021) (manuscript at 5–6, 12 n.86) (on file with author) ("[A]ll currently operating ATSs include no quotations in the public quotation stream." (citation omitted)).

12. I have argued that exchanges have strong incentives to regulate listed company disclosure and broker conduct of business in the absence of a government regulator. See generally Paul G. Mahoney, *The Exchange as Regulator*, 83 VA. L. REV. 1453 (1997). Given the current system, in

and brokers, however, the distinction serves no useful purpose and should be abolished.

The paper is structured as follows. Part II describes the path by which we arrived at the current system of equity market structure regulation, arguing that it reflects problems and intellectual trends that are in some cases no longer relevant. Part III discusses ways in which Regulation NMS does and indeed must fall short of its goal of providing the benefits of consolidated and competing markets. Part IV outlines an alternative set of regulatory principles and describes first steps the SEC could take to implement them. Part V concludes.

## II. THE EVOLUTION OF EQUITY MARKET STRUCTURE REGULATION

The SEC has long disclaimed a desire to determine the way in which exchanges organize trading or the fees they charge for their services.<sup>13</sup> In a long series of incremental steps, however, it has done both. This Part describes the evolution of the SEC's market structure role, focusing on the specific problems and complaints that prompted regulatory action and the intellectual trends that shaped it.

### A. *From the New Deal to the Securities Acts Amendments*

The Securities Exchange Act as originally enacted regulated market structure indirectly through its commands to exchanges to prevent fraud, manipulation, and excessive leverage.<sup>14</sup> The exchanges themselves, not the SEC, were expected to regulate the business conduct of their member brokers.<sup>15</sup> The original statute required that exchanges, but not their member broker-dealers, register with the SEC.<sup>16</sup> By registering, an exchange becomes a self-regulatory organization (SRO), a term added to the statute in 1975.<sup>17</sup> The exchange's rules

---

which the SEC comprehensively regulates both areas, the exchanges' regulatory role has become a relic.

13. See U.S. SEC. & EXCH. COMM'N, INSTITUTIONAL INVESTOR STUDY REPORT, H.R. DOC. NO. 92-64, at XXIII (1st Sess. 1971) ("We do not believe, however, that it is either feasible or desirable for the Commission or any other agency of the government to predetermine and require a particular structure . . ."); see also Regulation of Market Information Fees and Revenues, Exchange Act Release No. 42,208, 64 Fed. Reg. 70,613, 70,619 (Dec. 17, 1999) (in requiring fair and reasonable fees, Congress did not intend for SEC to become a ratemaking body).

14. These provisions, as amended, remain in the statute. See 15 U.S.C. §§ 78g (margin requirements), 78i (prohibition against manipulation), 78j(b) (general antifraud provision) (2018).

15. See 15 U.S.C. § 78f(b) (2018).

16. The exchange registration requirement, as amended, appears at 15 U.S.C. § 78e. Congress added in 1936 a requirement for brokers and dealers operating in over-the-counter markets to register. See Act of May 27, 1936, Pub. L. No. 74-621, § 3, 49 Stat. 1377 (codified as amended at 15 U.S.C. § 78o). The Securities Acts Amendments of 1975 extended the registration requirement to broker-dealers whose business was limited to on-exchange activity. See Securities Acts Amendments of 1975, Pub. L. No. 94-29, § 11, 89 Stat. 121.

17. See Securities Acts Amendments of 1975, Pub. L. No. 94-29, § 3(6), 89 Stat. 98 (adding new 15 U.S.C. § 78c(a)(26)).

govern the mechanics of trading, its fees, the conduct of its members, and the corporate governance of its listed companies. An SRO must submit proposed rule changes for public comment and SEC approval.<sup>18</sup>

Section 11 of the Act, however, gave the SEC direct influence over some aspects of the market structure.<sup>19</sup> Subsection (a) authorized it to regulate principal trading by exchange members, including specialists.<sup>20</sup> Subsection (b) directed it to provide, by rule, that a specialist may trade for its own account only to the extent necessary to maintain a fair and orderly market.<sup>21</sup> Finally, subsection (e) directed it to study the feasibility of the “complete segregation of the functions of dealer and broker.”<sup>22</sup>

These provisions stem from the 73<sup>rd</sup> Congress’s understanding of financial markets. Economists would not develop the main building blocks of financial economics—portfolio theory, informational efficiency, and asset pricing—until decades later.<sup>23</sup> While traders of the 1930s could rely on experience and observation to value assets, Congress relied on a set of sometimes mistaken intuitions that we can observe in the legislative history of the Exchange Act.

These intuitions included the belief that dealers who trade for their own account introduce excess volatility into prices.<sup>24</sup> This is because public investors were understood to be highly susceptible to chasing price trends. Legislators therefore understood financial professionals’ trading as motivated primarily by the desire to ignite momentum and profit from it.<sup>25</sup> It followed that principal trading by broker-dealers did not serve the interests of ordinary investors.<sup>26</sup>

18. 15 U.S.C. § 78s(b). Certain rule changes, including those relating to fees, are effective upon filing with the SEC. § 78s(b)(3)(A).

19. See Securities Exchange Act of 1934, Pub. L. No. 73-291, § 11, 48 Stat. 891–892.

20. *Id.*

21. *Id.*

22. *Id.*

23. Key contributions include Harry Markowitz, *Portfolio Selection*, 7 J. FIN. 77 (1952), Eugene F. Fama, *The Behavior of Stock Market Prices*, 38 J. BUS. 34 (1965), and William F. Sharpe, *Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk*, 19 J. FIN. 425 (1964), respectively.

24. The importance of active, constant trading can readily be exaggerated. A relatively stable market over a period is of much greater importance to investors than a fictitiously stable market that involves no more than one eighth of a point spread between sales but results in wide fluctuations over days or weeks. See H.R. REP NO. 73-1383, at 14 (1934).

25. See STOCK EXCHANGE PRACTICES, REPORT OF THE COMMITTEE ON BANKING AND CURRENCY, S. REP. NO. 73-1455, at 29 (1934) (claiming a floor trader’s “policy is to follow the trend whether up or down, and his trading greatly accelerates the trend and accentuates market fluctuations.”); see also *Stock Exchange Regulation: Hearings before the House Interstate and Foreign Commerce Committee: Hearings on H.R. 7852 and H.R. 8720*, 73rd Cong. 124 (1934) (statement of Thomas Corcoran) (asserting that floor traders “follow the market the way sea birds follow a ship, following the trend . . .”).

26. Roosevelt’s advisor Thomas Corcoran asserted:

The only interest the public has in a stock exchange is that it should be a place where the outside public can buy and sell its stocks. There is no public interest to be served by giving an inside seat to a small group of men who are trading for their own account.

Ultimately, however, Congress did not take it upon itself to design an optimal market structure. An early provision in the bill that became the Exchange Act, which would have barred stock exchange members from trading for their own account, was replaced by Section 11(e), which directed the SEC to consider doing so by rule after conducting a study.<sup>27</sup>

In the event, the SEC's Segregation Report under Section 11(e) concluded that it was too risky to separate the broker and dealer functions in one legislative or regulatory step.<sup>28</sup> Instead, it took a series of modest steps that included barring a specialist from trading for its own account except to the extent necessary to maintain an orderly market, as Section 11(b) of the statute directed.<sup>29</sup>

The statute also reflected a widespread contemporary belief in the efficacy of expert management of complex economic processes. The early New Deal reforms valued regimentation over competition. This was most visible in the National Industrial Recovery Act's wage and price setting and codes of fair conduct.<sup>30</sup> The same thinking shaped the securities laws. The Securities Act of 1933 codified a set of best practices in underwriting, making them mandatory for all public offerings.<sup>31</sup> The Exchange Act codified the New York Stock Exchange's disclosure requirements, making them mandatory for all exchanges.<sup>32</sup> By the time Congress revisited market structure, confidence in the effectiveness of expert administration had ebbed.

---

JOEL SELIGMAN, *THE TRANSFORMATION OF WALL STREET: A HISTORY OF THE SECURITIES AND EXCHANGE COMMISSION AND MODERN CORPORATE FINANCE* 86 (3<sup>rd</sup> ed. 2003). The Senate's report complained that own-account trades were not identified as such on the ticker tape, with the result that "[a] volume of trading which might readily have been considered to reflect a widespread public participation . . . represented . . . the activities of members themselves." *STOCK EXCHANGE PRACTICES*, *supra* note 25, at 20.

27. See H.R. 7855, 73rd Cong. § 10 (Feb. 10, 1934) (making it unlawful for any member of a securities exchange acting as broker to act as a dealer of any security).

28. See U.S. SEC. & EXCH. COMM'N, *REPORT ON THE FEASIBILITY AND ADVISABILITY OF THE COMPLETE SEGREGATION OF THE FUNCTIONS OF DEALER AND BROKER* at 101–102, 109 (1936) [hereinafter *SEGREGATION REPORT*] (advising an "evolutionary" approach).

29. See *id.* at 63.

30. See National Industrial Recovery Act, Pub. L. No. 73-67, §§ 3(a), 4(b), 48 Stat. 195, 196–197 (1933) ("Upon the application to the President by one or more trade or industrial associations or groups, the President may approve a code or codes of fair competition for the trade or industry . . ."). The Supreme Court subsequently invalidated a code of fair competition for the poultry industry and in doing so found the NIRA unconstitutional. See *generally* *A.L.A. Schechter Poultry Corp. v. United States*, 295 U.S. 495 (1935).

31. See Paul G. Mahoney, *The Political Economy of the Securities Act of 1933*, 30 J. LEGAL STUD. 1, 20–26 (2001) (concluding that the Securities Act made mandatory the practices of the top-tier investment banks).

32. See PAUL G. MAHONEY, *WASTING A CRISIS: WHY SECURITIES REGULATION FAILS* 80–81 (2015) (with Jianping Mei) ("[T]he SEC borrowed heavily from the NYSE's own disclosure rules to create a mandatory disclosure system.").



B. *The Securities Acts Amendments of 1975 and the birth of the NMS*

Congress's next significant foray into market structure came with the Securities Acts Amendments of 1975.<sup>33</sup> The statute responded to the paperwork crisis of the late 1960s, in which increased trading volumes overwhelmed the NYSE's paper-based trade reconciliation and settlement systems.<sup>34</sup> Large brokerage houses reacted by transitioning to computer-based back-office processing. Many smaller firms, along with a few large ones that did not manage the transition effectively, either failed or were acquired.<sup>35</sup>

Noticing that the increased trading volumes reflected the growing participation of institutional investors such as mutual funds, pension plans, and insurance companies in the equity markets, and maintaining a residual fear that trading by professional investors is inherently destabilizing, Congress directed the SEC to study the influence of institutional investors on the securities markets.<sup>36</sup> In March 1971, the SEC delivered its 3,000-page report and 2,000 pages of supplemental information, known as the Institutional Investor Study.<sup>37</sup>

Among other things, the study concluded that institutions struggled to find liquidity in sufficient depth for their trading needs.<sup>38</sup> While the NYSE specialist system was adequate for the needs of retail investors, it was not well-adapted for trades of block size. These required a degree of negotiation before exposure to the rest of the market.

Accordingly, NYSE members developed the practice of negotiating "upstairs," or off the exchange floor, with institutional investors who desired to buy or sell blocks of listed shares. A dealer could agree to take the opposite side of the trade at a negotiated price. The deal would then be taken to the specialist, who could substitute orders on his book for part of the block trade.<sup>39</sup> In this way, institutions could negotiate with dealers off the floor without bypassing public orders at better prices.

The Institutional Investor Study discussed the block trading market in detail.<sup>40</sup> Oddly, it did not consider the effect of the specialist's negative obligation in Section 11(b). An SEC staff interpretation from 1937 held that each individ-

---

33. Securities Acts Amendments of 1975, Pub. L. No. 94-29, 89 Stat. 97.

34. See MARSHALL BLUME ET AL., *REVOLUTION ON WALL STREET: THE RISE AND FALL OF THE NEW YORK STOCK EXCHANGE* 116-27 (1993).

35. See Wyatt Wells, *Certificates and Computers: The Remaking of Wall Street, 1967 to 1971*, 74 BUS. HIST. REV. 193, 232 (2000).

36. Act of July 29, 1968, Pub. L. No. 90-438, 82 Stat. 453 (codified as amended at 15 U.S.C. § 78s(e)).

37. See generally U.S. SEC. & EXCH. COMM'N, *INSTITUTIONAL INVESTOR STUDY REPORT*, H.R. DOC. NO. 92-64 (1st Sess. 1971).

38. See *id.* at 95 ("[T]he growing importance of institutional trading has put added strains on these markets . . . [because of] the relatively large transactions preferred by institutional investors.").

39. See Hans R. Stoll, *The Stock Exchange Specialist System: An Economic Analysis*, in *MONOGRAPH SERIES IN FIN. & ECON.* 1, 15 (Salomon Bros. Ctr. for Study Fin. Insts., 1985).

40. See U.S. SEC. & EXCH. COMM'N, *INSTITUTIONAL INVESTOR STUDY REPORT*, H.R. DOC. NO. 92-64, at 1537-828 (1st Sess. 1971).

ual trade by the specialist must be necessary to maintain a fair and orderly market.<sup>41</sup> As a consequence, a specialist could not agree to buy a block of shares and then gradually sell it into the market—the latter trades would not be “necessary.”

This is not to say that the ordinary trading mechanism at the NYSE could easily have accommodated block trades absent Section 11(b) and the staff interpretation. There would have been substantial issues to resolve, including how the specialist could assure the best execution of all orders left with him if some were non-discretionary orders from retail customers and others were discretionary orders from institutions. A possible solution—giving institutions direct access to the specialist post on the same terms as floor traders—would have evaded and possibly destroyed the fixed commission system.

The negative obligation nevertheless sidelined the specialist in the block trading process. Block positioners, or dealers who assembled and disposed of blocks of shares on behalf of institutional investors, traded on the NYSE, on regional exchanges, and in the “third market,” meaning dealers who were not NYSE members but traded listed stocks over the counter. The SEC identified the resulting fragmentation of trading in listed securities as a problem to be addressed.<sup>42</sup> The SEC thought a “central market system” that could permit all potential buyers and sellers to interact with one another would better serve investors.<sup>43</sup>

The system of fixed commissions on the NYSE, however, posed a barrier to a central market. The desire to avoid those commissions led investors to route orders to other markets, producing fragmentation. The NYSE attempted to counter this through rules that limited its members’ ability to trade listed stocks off the exchange.<sup>44</sup> The NYSE’s rules had barred members from trading listed stocks on regional exchanges until 1941, when the SEC required it to relax the rule.<sup>45</sup> At the time of the 1975 amendments, NYSE Rule 394 restricted exchange members from trading directly with third market dealers.<sup>46</sup>

Although disavowing an intent to impose a market structure of the SEC’s devising, the Institutional Investor Study noted with approval that developments in communications and data processing made it feasible to link the primary and regional exchanges together without merging them into a single entity.<sup>47</sup> The

---

41. See generally Exchange Act Release No. 1117, 1937 SEC Lexis 357 (Mar. 30, 1937).

42. See U.S. SEC. & EXCH. COMM’N, INSTITUTIONAL INVESTOR STUDY REPORT, H.R. DOC. NO. 92-64, at XXIV (1st Sess. 1971) (“[T]here has been no market which was strong enough and liquid enough to serve as a major central market.”).

43. See *id.* (“A major goal and ideal . . . has been the creation of a strong central market system . . . in which all buying and selling interest . . . could participate . . .”).

44. See *id.* at XXII.

45. See The Rules of the New York Stock Exch., 10 S.E.C. 270 (1941).

46. See Note, *NYSE Rules and the Antitrust Laws—Rule 394—Necessary Restriction or Illegal Refusal to Deal?*, 45 ST. JOHN’S L. REV. 812, 828 (1971).

47. See U.S. SEC. & EXCH. COMM’N, INSTITUTIONAL INVESTOR STUDY REPORT, H.R. DOC. NO. 92-64, at XXIII (1st Sess. 1971) (“We believe that because of modern communication and data

SEC identified exchange restrictions on trading listed stocks off-exchange as a significant impediment to such links.

Five months after the SEC published the Institutional Investor Study, the NYSE released a report that it had commissioned from the recently retired chair of the Board of Governors of the Federal Reserve System and former NYSE chair, William McChesney Martin, Jr.<sup>48</sup> The Martin Report also recommended a form of centralized market. It proposed that each exchange become the exclusive venue for trading its listed stocks. It also, however, proposed to maintain fixed commissions and the panoply of incidental rules that kept institutional investors from obtaining direct access to the market.

This effort to preserve the NYSE's fixed commission structure doomed the Martin Report to condemnation as an anticompetitive rearguard action.<sup>49</sup> Ignoring its recommendations, the SEC moved toward a system of separate but linked markets and received explicit instruction from Congress to pursue a "national market system" (NMS) in the 1975 amendments.<sup>50</sup>

Those amendments added a new emphasis on decentralization and competition to the Exchange Act. By the mid-1970s, the intellectual pendulum had swung away from faith in one size fits all regulation. In 1971, George Stigler published *The Theory of Economic Regulation*, providing a theoretical account of the competitive harms that can result from the combined self-interest of regulators and the regulated.<sup>51</sup> Politicians from both major parties concluded that many regulated industries were insufficiently competitive, to the detriment of consumers.<sup>52</sup> This intellectual and political shift resulted in the easing of regulatory price and entry restrictions, most prominently in the airline, trucking, and telecommunications industries.<sup>53</sup>

The Securities Acts Amendments reflected this change in attitude. While the Exchange Act as originally enacted did not contain a single reference to "competition," the word appears 23 times in the 1975 amendments, including the preamble's declaration of a legislative desire "to remove barriers to competition" in the Exchange Act.<sup>54</sup> Most notably, the statute ordered the SEC to end

---

processing facilities it is possible to preserve geographically separated trading markets while at the same time tying them together on a national basis.").

48. See generally WILLIAM MCCHESENEY MARTIN, JR., *THE SECURITIES MARKET* (1971).

49. See e.g., Donald E. Farrar, *The Martin Report: Wall Street's Proposed "Great Leap Backward"*, 27 FIN. ANALYSTS J., Sep–Oct 1971, at 14, 16 (1971).

50. 15 U.S.C. § 78k-1(a)(2) (2018) ("The Commission is directed . . . to use its authority . . . to facilitate the establishment of a national market system for securities . . .").

51. See George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. 3, 3 (1971) ("A central thesis of this paper is that, as a rule, regulation is acquired by the industry and is designed and operated primarily for its benefit.").

52. See Reuel Schiller, *The Ideological Origins of Deregulation*, THE REGUL. REV. (Mar. 18, 2019), <https://www.theregreview.org/2019/03/18/schiller-ideological-origins-deregulation/>.

53. See MARTHA DERTHICK & PAUL J. QUIRK, *THE POLITICS OF DEREGULATION* 1 (1985).

54. Securities Act Amendments of 1975, Pub. L. 94–29, 89 Stat. 97.

fixed commissions on the NYSE, a process already underway at the time of enactment.<sup>55</sup>

A second consequential intellectual development was the emergence of a theory of market microstructure (although not yet under that name).<sup>56</sup> From the enactment of the Exchange Act until the mid-1960s, the central policy debate was whether market intermediaries exaggerate or retard price trends. The SEC's 1963 Special Study of the Securities Markets analyzed data to determine whether specialists and floor traders exercised a "stabilizing" influence by trading in the opposite direction of price movements, or the reverse.<sup>57</sup> In that respect, the Special Study did not represent a conceptual advance from the SEC's Segregation Report of 1936, which had similarly focused on whether specialists and floor traders followed or leaned against price trends.<sup>58</sup>

In response to the Special Study, Stigler provided a different and novel analysis of the role of specialists and floor traders.<sup>59</sup> He conceived of investors as having individual demand schedules for stocks. Rather than submitting these all at once to an auctioneer to determine a market-clearing price, individual investors submit bids and offers asynchronously and in random sequence to the central market. Each order rests there until it either finds a match or expires. In this informal model, a liquidity supplier can profit by selling to buyers whose bids are above the market-clearing price and vice versa. These liquidity suppliers make investors better off by increasing the probability of transacting and reducing the delay between orders and executions.

The criterion of market efficiency in such a setting is not the stability of prices but the cost of transacting as measured by the bid-ask spread.<sup>60</sup> Harold Demsetz formalized the analysis, modeling the bid-ask spread as the price of "immediacy," or the ability to convert securities to cash or vice versa with minimal delay.<sup>61</sup> The market microstructure literature developed from this basic insight.

The initial focus of that literature was to identify the determinants of the bid-ask spread quoted by a given market maker.<sup>62</sup> An early paper noted that

---

55. See 15 U.S.C. § 78f(e)(1) (2018).

56. As far as I am aware, the term was first used by Mark B. Garman, *Market Microstructure*, 3 J. FIN. ECON. 257 (1976).

57. See U.S. SEC. EXCH. COMM'N, REPORT OF SPECIAL STUDY OF THE SECURITIES MARKETS, H.R. DOC. NO. 88-95, at 106-110, 213-18 (1st Sess. 1963).

58. See SEGREGATION REPORT, *supra* note 28, at 19-21, 35-37.

59. See George J. Stigler, *Public Regulation of the Securities Markets*, 37 J. BUS. 117, 124-33 (1964).

60. *Id.* at 129 ("In this regime the cost of transactions (half the bid-ask spread plus commissions) will be the complete inverse measure of the efficiency of the markets.")

61. See Harold Demsetz, *The Cost of Transacting*, 82 Q.J. ECON. 33, 35-37 (1968).

62. *Id.* at 40-55; see also Seha M. Tinic, *The Economics of Liquidity Services*, 86 Q.J. ECON. 79, 79-80 (1972). See generally Kalman J. Cohen et al., *Market Makers and the Market Spread: A Review of Recent Literature*, 14 J. FIN. & QUANT. ANALYSIS 813, 819 (1979) (noting literature's focus on the individual dealer/specialist bid-ask spreads).

market makers suffer trading losses to investors who possess information not yet reflected in prices.<sup>63</sup> The market maker must set a spread sufficient to cover these adverse selection costs. Economists also identified various factors affecting the market maker's inventory management costs, including trading volume and volatility.<sup>64</sup>

This emphasis on cost at the level of the individual market maker led scholars to ask whether economies of scale made the position of liquidity provider—in effect, the exchange specialist—a natural monopoly.<sup>65</sup> Later scholars would note that this focus was incomplete because it ignored the fact that public investors who submit limit orders compete with the exchange specialist and floor traders to supply liquidity and capture the spread.<sup>66</sup> That insight was not yet formalized at the time of the 1975 amendments and the SEC's first steps toward implementation.

Commentators accordingly viewed the NYSE's auction market as inferior to Nasdaq's competitive dealer market. Everything about the NYSE—fixed commissions, restrictions on off-exchange trading, the ban on institutional membership, the single specialist barred from doing business directly with anyone other than exchange members—looked monopolistic to critics. Seymour Smidt, an economist who served as an associate director of the Institutional Investor Study, and Morris Mendelson, an economist who wrote a detailed blueprint for a centralized market, both took it as obvious that an optimal market would look more like the Nasdaq dealer market than the NYSE auction market.<sup>67</sup>

The SEC was eager to create competition for the NYSE specialist and focused on intermarket linkages as the means.<sup>68</sup> Beginning in 1971, the SEC pressured the exchanges and the National Association of Securities Dealers

---

63. See Walter Bagehot (pseudonym for Jack L. Treynor), *The Only Game in Town*, 27 FIN. ANALYSTS J. 12, 13 (1971) (“The market maker always loses” to “transactors possessing special information”; therefore “his gains from liquidity-motivated transactors must exceed his losses to information-motivated transactors.”). The dynamic interaction of information traders and market makers was formalized by Albert S. Kyle, *Continuous Auctions and Insider Trading*, 53 ECONOMETRICA 1315 (1985).

64. See Tinic, *supra* note 62, at 80.

65. Compare Demsetz, *supra* note 61, at 42 (“scale economies with respect to the transactions of a particular trader suggest natural monopoly”), with Seymour Smidt, *Which Road to an Efficient Stock Market: Free Competition or Regulated Monopoly?*, 27 FIN. ANALYSTS J. 18, 64 (1971) (“There is no empirical evidence to support the proposition that [market making] is, in fact, a natural monopoly.”).

66. See Cohen et al., *supra* note 62, at 814 (“[I]nadequate attention has been given to the fact that, via their limit orders, ‘ordinary’ traders also supply immediacy”).

67. See Smidt, *supra* note 65, at 65–66; see also Morris Mendelson, *From Automated Quotes to Automated Trading: Restructuring the Stock Market in the U.S.* 34–35, N.Y.U. GRADUATE SCH. OF BUS. ADMIN. INST. OF FIN. BULL. NOS. 80–82, at 34–35 (1972).

68. See generally Paul G. Mahoney & Gabriel V. Rauterberg, *The Regulation of Trading Markets*, in Merritt B. Fox et al., eds., *Securities Market Issues for the 21<sup>st</sup> Century* 221, 234–236 (Merritt B. Fox et al. eds., 2018).

(NASD) to create a consolidated tape to report the prices and quantities of all transactions in listed securities.<sup>69</sup> The SEC also proposed a consolidated quotation system to display publicly the best bids and offers on each exchange and from each dealer in listed stocks. The NYSE, which viewed the specialist's book as proprietary, strongly resisted the latter project.<sup>70</sup>

The 1975 amendments, however, removed any doubt about the SEC's authority to require "linking of all markets . . . through communication and data processing facilities."<sup>71</sup> The SEC required the exchanges and the NASD to create a consolidated quotation system.<sup>72</sup> The market centers were to report last-sale and quotation data to a "securities information processor" (SIP), which would then sell the information to third parties on terms that the Exchange Act requires to be "fair and reasonable."<sup>73</sup>

The NYSE and American Stock Exchange created a jointly owned SIP to disseminate quotations in listed securities and options while Nasdaq registered as a SIP for Nasdaq-traded and other over-the-counter securities.<sup>74</sup> The relevant market centers formed joint committees, or "Plans," to determine the fees they would charge for market data and how to allocate the resulting revenue among the participating markets. As a practical matter, then, the trading markets collectively negotiated the price of access to quotations with the professional investment community.

Finally, at the SEC's urging, the exchanges and the NASD created order routing linkages, known as the Intermarket Trading System (ITS). The ITS was first implemented as an experiment but in 1983 gained SEC approval to operate indefinitely.<sup>75</sup> It consisted of a messaging system through which a broker on the floor of one exchange could transmit an order to another participating market. In connection with the ITS, the exchanges adopted rules limiting the ability of a member broker to initiate a "trade through," meaning a trade at a price inferior to that displayed by another ITS market.<sup>76</sup>

The ITS required exchanges to act against their self-interest. An exchange desires to execute an order for which it is the initial point of entry. No exchange, therefore, had an incentive to maintain the ITS at the leading edge of

---

69. See Rule 17a-15, 17 C.F.R. § 240.17a-15 (1973) (amended and replaced by Rule 601 of Regulation NMS, 17 C.F.R. § 242.601 (2020)).

70. See Regulation of Market Information Fees and Revenues, *supra* note 13, at 70,620 (describing history of consolidated quotation system).

71. See 15 U.S.C. § 78k-1(a)(1)(D) (2018).

72. See Display of Transaction Reports, 45 Fed. Reg. 12,369, 12,405-07 (1980) (codified at 17 C.F.R. 240.11Ac1-2) (amended and replaced by Rule 602 of Regulation NMS, 17 C.F.R. § 242.602 (2020)).

73. See 15 U.S.C. § 78k-1(c)(1)(C) (2018).

74. See Regulation of Market Information Fees and Revenues, *supra* note 13, at 70,616, n.18.

75. See Am. Stock Exch., Inc., Exchange Act Release No. 19,456, 48 Fed. Reg. 4,938, 4,938-39 (1983).

76. See *id.* at 4,939.

information technology.<sup>77</sup> Nor did the exchanges have incentives to enforce trade-through protections, a task they left to the broker representing an order that was traded through.<sup>78</sup>

The SEC's initial plan had been more disruptive still to existing market models. Announcing its desire for an ITS in 1978, the SEC stated that its ultimate goal was to require the exchanges to create a "central limit order file" and to recognize time as well as price priority for all public limit orders in the file.<sup>79</sup> In that system, a broker would be barred from executing an order outside the central file if an order at the same or a better price was available in the file. If the file contained multiple orders at the best price, the one first in time would be first to execute. However, the exchanges strongly opposed the central file on the grounds that it would reduce dealers' incentives to make markets and ultimately displace the exchanges' trading floors. The SEC backed down.<sup>80</sup>

A plausible reading of the 1975 amendments is that Congress wanted the SEC to sweep aside all of the NYSE's anti-competitive rules, not just fixed commissions, then permit competition to determine the way in which price and quotation information would reach brokers and how those brokers would seek the best execution for their customers.<sup>81</sup> Instead, the SEC chose to centralize not just post-trade price and volume data, but also pre-trade quotation data, and to force exchanges to route trades to their competitors. The SEC apparently took the NYSE's anticompetitive practices as empirical proof that competition among traders and trading venues cannot produce efficient market structures without direct regulatory intervention. The conclusion was hasty for two reasons.

At the time of the 1975 amendments, the stock exchanges' role as SROs bearing statutory obligations complicated the application of normal antitrust principles to anti-competitive exchange policies.<sup>82</sup> The Seventh Circuit had re-

---

77. See Hans R. Stoll, *Market Fragmentation*, 57 FIN. ANALYSTS J. 16, 16 (2001) ("The ITS . . . has not kept pace with technology").

78. See Mahoney & Rauterberg, *supra* note 68, at 236.

79. See Development of National Market System, Exchange Act Release No. 14,416, 43 Fed. Reg. 4,353, 4,359 (1978).

80. See Development of a National Market System, Exchange Act Release No. 15,671, 44 Fed. Reg. 20,360, 20,362 (1979) ("[T]he Commission recognizes the possibility that introduction of a system based upon the absolute time priority concept could have a radical and potentially disruptive impact on the trading process . . . . Therefore, industry and Commission efforts should be concentrated on the achievement of nation-wide protection for all public limit orders based on the principle of price priority.").

81. See Gallagher, *supra* note 3, at 3 (noting that, under 1975 Amendments, "competitive forces" were supposed to drive market development" (citation omitted)); see also Jonathan R. Macey & David D. Haddock, *Shirking at the SEC: The Failure of the National Market System*, 1985 U. ILL. L. REV. 315, 323-24 (1985) ("[T]he proper process seems to be to eliminate the restrictions on market participation, then to allow the market to dictate the evolution of the appropriate communications systems").

82. See *Silver v. NYSE*, 373 U.S. 341, 360-61 (1963) (although self-regulatory status of exchanges does not convey a blanket exemption from the antitrust laws, actions "which fall within

cently held that the fixed commission rule was an exercise of the self-regulatory function and accordingly outside the scope of the antitrust laws.<sup>83</sup> Just weeks after the 1975 amendments were enacted, the Supreme Court concluded that the Exchange Act pre-empted the antitrust laws with respect to stock exchange commission rates.<sup>84</sup> Absent the statutory scheme that Congress created and the SEC administered, the NYSE's rules would have been subject to antitrust scrutiny and the fixed commission rule likely invalidated long before 1975.

Moreover, at the time of the 1975 amendments, it had only recently become technologically feasible for electronic order entry, routing, and execution to replace face-to-face or telephonic communication. The Institutional Investor Study observed that “[u]ntil comparatively recently there were serious technological limitations on creating a system where all interests of investors could be represented in a central market.”<sup>85</sup> But it went on to argue that centralizing trading on a single market produces “a certain amount of monopoly power, particularly with respect to the dealer function.”<sup>86</sup> The SEC therefore concluded that investors and exchanges would not take full advantage of new technologies without prodding.

### C. From the 1975 Amendments to Regulation NMS

In the decade after the 1975 amendments, economists gained a more detailed appreciation for the role that limit orders play in a specialist market and accordingly came to see the distinction between dealer and auction markets in a different light.<sup>87</sup> In theory, limit orders provide competition to the specialist, meaning that the specialist cannot unilaterally determine the market bid-ask spread for a listed stock.<sup>88</sup> Empirically, as of the mid-1970s, about 50% of traded volume on the NYSE involved a limit order on the specialist's book, compared to about 25% of traded volume in which the specialist took one side of the trade as principal.<sup>89</sup>

Were the Nasdaq dealer market more competitive than the NYSE auction market, one would have expected bid-ask spreads to be smaller on Nasdaq for

---

the scope and purposes of the Securities Exchange Act may be regarded as justified” for antitrust purposes).

83. See *Kaplan v. Lehman Bros.*, 371 F.2d 409 (7<sup>th</sup> Cir. 1967), *cert. denied*, 389 U.S. 954 (1967).

84. See *Gordon v. NYSE*, 422 U.S. 659, 691 (1975).

85. U.S. SEC. & EXCH. COMM'N, INSTITUTIONAL INVESTOR STUDY REPORT, H.R. DOC. NO. 92-64, at XXIV (1st Sess. 1971).

86. *Id.*

87. See generally Robert C. Klemkosky & Robert M. Conroy, *Competition and the Cost of Liquidity to Investors*, 37 J. ECON. & BUS. 183, 184 (1985) (distinguishing external competition from other dealers and internal competition from limit orders).

88. See Kalman J. Cohen et al., *Transaction Costs, Order Placement Strategy, and Existence of the Bid-Ask Spread*, 89 J. POL. ECON. 287, 297 (1981).

89. See Stoll, *supra* note 39, at 14–15.



stocks of similar size and trading volume. However, studies consistently found lower average quoted spreads on the NYSE.<sup>90</sup> Although there are many possible explanations, including differential inventory or information costs, the empirical results focused further attention on the role that limit orders play in the NYSE auction market.

Public traders who submit limit orders operate at a disadvantage relative to NYSE specialists or Nasdaq market makers. Professional dealers intensely monitor the market in their assigned stocks and can adjust their quotations rapidly and frequently. By contrast, public traders have other demands on their time and can adjust their prices only episodically. Public investors who send limit orders to the specialist through their brokers, therefore, write options to the rest of the market.<sup>91</sup> They do so in the belief that the expected gains from buying or selling at superior prices exceed the implicit option premium. The rest of the market meanwhile benefits from the option in the form of lower average spreads.

This insight, in turn, produces a slightly different outlook on the competing dealer model. Nasdaq was designed as a pure dealer market. Every customer trade was with a market maker at its bid or ask price. In principle, a broker could leave a limit order with a market maker, but unlike the NYSE specialist, the Nasdaq market maker had no obligation to give it priority over its own quotations or expose it to the rest of the market. Instead, the market maker could trade against the order as principal if and when it found it in its interests to do so. The bid-ask spread, therefore, was determined by competition among dealers in which public limit orders did not play a material role.

Having concluded that the NYSE auction model was *more* competitive than it appeared at first glance, economists soon concluded that the competing dealer model might be *less* competitive than it appeared – at least as realized on Nasdaq in the early 1990s. Although the minimum tick size on Nasdaq was one-eighth of a dollar, William Christie and Paul Schultz demonstrated that dealers largely avoided quotes at odd eighths.<sup>92</sup> Thus the quoted spread for many stocks was at least twenty-five cents. The Christie and Schultz paper raised the possibility that dealers were colluding to maintain a wider spread.

The SEC responded to the resulting outcry by adopting the so-called “order handling rules” in 1996.<sup>93</sup> Among other things, the order handling rules required Nasdaq market makers and exchange specialists to display customer limit orders that improved either the price or size of the dealer’s own quote. After

---

90. See Ananth Madhavan, *Market Microstructure: A Survey*, 3 J. FIN. MKTS. 205, 231 (2000).

91. See generally Thomas E. Copeland & Dan Galai, *Information Effects on the Bid-Ask Spread*, 38 J. FIN. 1457 (1983).

92. See William G. Christie & Paul H. Schultz, *Why Do NASDAQ Market Makers Avoid Odd-Eighth Quotes?*, 49 J. FIN. 1813, 1838 (1994).

93. See Order Execution Obligations, Exchange Act Release No. 37,619A, 61 Fed. Reg. 48,290 (Sept. 12, 1996). The order handling rules are now codified at 17 C.F.R. § 242.604 (2020).

the rule's implementation in 1997, the Nasdaq market incorporated auction features, just as the ITS introduced competing-quotation features to the auction markets. The two models would soon converge.

By the close of the 20<sup>th</sup> century, the SEC had required the regulated exchanges to create a consolidated trade reporting system, a consolidated quotation system, and a set of intermarket communication links enabling an exchange receiving an order to route it to one displaying a superior price. There was nevertheless reason to question whether these structural changes had created robust competition among venues and market makers. Two facts in particular stood out.

The NYSE remained the dominant market for its listed stocks, accounting for roughly 90% of on-exchange trading volume and 80% of total trading volume in its listed stocks.<sup>94</sup> The SEC accordingly pressured the NYSE to eliminate Rule 390, the successor to Rule 394, which continued to limit members' ability to trade listed securities as principal off the exchange floor. The NYSE repealed the rule in 2000.<sup>95</sup>

Meanwhile, despite a change in the minimum tick size from one-eighth to one-sixteenth on Nasdaq, the NYSE's quoted and realized spreads remained smaller than those on Nasdaq.<sup>96</sup> Hendrik Bessembinder, who documented the fact, attributed it to the widespread practice of "preferencing" Nasdaq order flow.<sup>97</sup> In a preferencing arrangement, a broker agrees to route orders to a particular market maker, with the latter agreeing to execute at the best quote even if it was not currently displaying the best quote.<sup>98</sup> Preferencing weakens market makers' incentives to quote aggressively because they can capture order flow without publicly displaying the best price.

These indicia of less-than-perfect competition coexisted with indicia of market fragmentation. The order handling rules led to a growing volume of trading in Nasdaq stocks through ATSS.<sup>99</sup> At that time, ATSS traded primarily in Nasdaq stocks, although they began to trade actively in NYSE stocks after the repeal of Rule 390. An ATS that chose to display its best quotes publicly, known as an "electronic communications network" (ECN), could require that Nasdaq incorporate those quotes into the consolidated quotation system.<sup>100</sup>

---

94. See Treasury Press Release, *supra* note 7, at 53 fig.6 (showing the share of on-exchange volume); see also Angel, Harris & Spatt, *supra* note 2, at 18–19 (showing the share of total trading volume).

95. See Order Approving Proposed Rule Change to Rescind Exchange Rule 390, Exchange Act Release 42,758, 65 Fed. Reg. 30,175, 30,176 (May 10, 2000).

96. See Hendrik Bessembinder, *Trade Execution Costs on Nasdaq and the NYSE: A Post-Reform Comparison*, 34 J. FIN. & QUANTITATIVE ANALYSIS 387, 388 (1999).

97. *Id.* at 389–90.

98. See Paul E. Godek, *Why Nasdaq Market Makers Avoid Odd-Eighth Quotes*, 41 J. FIN. ECON. 465, 466–67 (1996).

99. See Notice of Filing of Proposed Rule Change to Rescind Rule 390; Exchange Act Release No. 42,450, 65 Fed. Reg. 10,577, 10,580 (Feb. 28, 2000).

100. See 17 C.F.R. §242.600(b)(24) (2020) (defining "electronic communications network").

Other ATSS, known as “dark pools,” chose not to display quotations.<sup>101</sup> Although some ATSS initially decided to operate as ECNs, at present all ATS operate as dark pools.<sup>102</sup>

In addition, brokers route retail orders to dealers who execute the trades from their own inventory outside the organized markets, a practice known as “internalization.” Because retail customers’ orders are considered safe (that is, not informed), dealers are eager to execute them and earn the spread—so much so that they pay brokers to route orders to them, a practice known as payment for order flow.<sup>103</sup>

Meanwhile, the market microstructure literature debated the relative merits of consolidating order flow onto a single venue versus allowing multiple venues to compete with one another. Lawrence Glosten demonstrated the theoretical appeal of a consolidated limit order book (CLOB) open to all traders, displaying the price and size of all limit orders, and running an automated continuous auction.<sup>104</sup> An idealized CLOB, he argued, would produce a sufficiently small bid-ask spread that no exchange or dealer would have an incentive to compete with it. Moreover, the CLOB would produce as much liquidity as feasible given the existence of an information asymmetry among traders.

The challenge for an open CLOB is practical: how would its services be priced? An open CLOB would be in essence a public utility. If the owner could not make a profit, no one would have an incentive to build it. On the other hand, if the CLOB did indeed centralize all trading, the owner could charge a monopoly price for market access and/or data.<sup>105</sup> Thus, when a group led by Goldman Sachs, Merrill Lynch, and Morgan Stanley proposed that the SEC require a CLOB and offered to build and operate it, other industry participants shouted down the proposal as anticompetitive.<sup>106</sup>

Other academics argued in favor of competition among trading venues over consolidation on a single venue. Larry Harris noted that the needs of large and small traders differ and market fragmentation is one response.<sup>107</sup> The develop-

---

101. See Mahoney & Rauterberg, *supra* note 68, at 242–43.

102. See Rauterberg, *supra* note 11 (manuscript at 6).

103. See Allen Ferrell, *A Proposal for Solving the Payment for Order Flow Problem*, 74 S. CAL. L. REV. 1027, 1029 (2001).

104. See generally Lawrence R. Glosten, *Is the Electronic Open Limit Order Book Inevitable?*, 49 J. FIN. 1127 (1994).

105. See Craig Pirrong, *Securities Market Macrostructure: Property Rights and the Efficiency of Securities Trading*, 18 J.L. ECON. & ORG. 385, 386 (2002) (suggesting that, while centralizing trading improves welfare under open access, the operator of the central market has an incentive to limit access to maximize profit).

106. See Michael Schroeder, *Stock-Trading Powerhouses Change Tune on Overhaul*, WALL ST. J. (June 2, 2000), <https://www.wsj.com/articles/SB959892058978104469>.

107. See Lawrence E. Harris, *Consolidation, Fragmentation, Segmentation, and Regulation*, in GLOBAL EQUITY MARKETS: TECHNOLOGICAL, COMPETITIVE, AND REGULATORY CHALLENGES 269, 275–77 (Robert A. Schwartz ed., 1995).

ing literature on network effects suggested that the loss of consumer surplus from monopoly may outweigh network efficiencies.<sup>108</sup>

Still others contended that efficient market structures could arise from the decentralized decisions of market participants without regulatory guidance. Hans Stoll argued that the ITS was ill-conceived. The SEC need not require exchanges to create intermarket linkages so long as brokers seek the best execution on behalf of their customers and the exchanges publicize their best bids and offers.<sup>109</sup> Under those conditions, brokers will create their own links to the competing markets and use them to route orders to the market offering the best price. Unlike exchanges, which do not benefit individually from intermarket linkages, brokers would have an incentive to make theirs as quick and effective as possible.

Yakov Amihud and Haim Mendelson proposed a different form of decentralized decision making about market structure.<sup>110</sup> They argued that publicly traded companies should be able to select the markets in which their securities will trade. Because there is a positive association between liquidity and market value, issuers have an incentive to select the trading venue(s) that maximize the stock's liquidity and thereby its share price.<sup>111</sup> Issuers' choices could be the mechanism driving exchanges to provide efficient trading platforms. Issuers might choose to centralize all trading on a single venue, to disperse trading among as many platforms as possible, or something in between, depending on the liquidity consequences.

The SEC, however, concluded that its preferred system of separate but linked markets, with some revisions, could provide the best of both worlds—competition among market venues and interaction of all customer orders. In Regulation NMS, adopted in 2005 and implemented in phases during 2006, it addressed what it viewed as the deficiencies in the ITS.

In particular, Regulation NMS replaced existing exchange rules governing trade-throughs and market access with SEC-determined rules binding on the exchanges. Its “order protection rule” (OPR) requires market centers (including Nasdaq and over-the-counter market-makers, which were not previously subject to the exchange trade-through rules) to design policies and procedures reasonably designed to prevent trade-throughs of “protected quotations.”<sup>112</sup> Only quotations available for automatic and immediate execution are protected.<sup>113</sup> Under

---

108. See Nicholas Economides, *The Economics of Networks*, 14 INT'L J. INDUS. ORG. 673, 683 (1996).

109. See Stoll, *supra* note 77, at 19.

110. See Yakov Amihud & Haim Mendelson, *A New Approach to the Regulation of Trading Across Securities Markets*, 71 N.Y.U. L. REV. 1411, 1415–16 (1996).

111. On the association between liquidity and market value, see Yakov Amihud and Haim Mendelson, *Asset Pricing and the Bid-Ask Spread*, 17 J. FIN. ECON. 223, 246–47 (1986).

112. See Order Protection Rule, 17 C.F.R. § 242.611(a)(1) (2020).

113. A “protected quotation” includes a “protected bid or protected offer”, NMS Security Designation and Definitions, 17 C.F.R. § 600(b)(62) (2020). The latter terms are limited to “automated quotations.” See *id.* § 242.600(b)(61)(iii). An “automated quotation” is one displayed by a

the so-called “Access Rule,” trading centers are required to provide nondiscriminatory execution access to those quotations and to charge no more than three-tenths of a cent per share for such access.<sup>114</sup>

The OPR and associated rule changes were controversial. Their adoption prompted a lengthy dissent by two of the five commissioners, who argued that the new regulations would have a “detrimental impact on competition and innovation.”<sup>115</sup> They predicted that the OPR would homogenize exchanges and fail to encourage traders to display liquidity publicly.<sup>116</sup> As I discuss in the next section, both predictions were accurate.<sup>117</sup>

### III. DRAWBACKS OF REGULATION NMS

This section discusses the drawbacks of the current structure in detail. Unfortunately, the multiplicity of trading venues has not produced innovation in trading methods nor competitive pricing for market data. Instead, innovation and competition have come in the form of complex access fee structures and investments in communicating ever more rapidly from one venue to another, neither of which is clearly socially beneficial.

An obvious counterargument is that the equity markets are functioning quite well, particularly for the largest traded companies. There is always a danger that changing the system would reduce market quality, a point I address at the end of this section.

#### A. Regulation NMS and Market Fragmentation

As of July 2020, there are thirteen operating equity exchanges in the United States. In 2000, by contrast, there were eight. Beginning in 2005, Nasdaq and the NYSE acquired the other six of those, but have maintained them as separate exchanges, in some cases operating under different access fee and rebate structures.<sup>118</sup> A new family of exchanges, BATS (now owned by CBOE and com-

---

trading center that “immediately and automatically” executes an incoming market order against that quotation. *See id.* § 242.600(b)(4).

114. *See* 17 C.F.R. § 242.610(a) (2020) (nondiscriminatory access); *see id.* § 242.610(c) (fee cap).

115. Regulation NMS, Exchange Act Release No. 51,808, 70 Fed. Reg. 37,496, 37,632 (June 29, 2005) (Comm’rs Cynthia A. Glassman and Paul S. Atkins, dissenting).

116. *Id.* at 37,640 (“the trade-through rule will restrict competitive forces and reduce markets to the lowest common denominator”); *see id.* at 37,637 (noting that OPR will “provide more incentive to maintain liquidity in reserve, rather than to display it publicly”).

117. *See also* Gallagher, *supra* note 3, at 5 (“As Commissioners Atkins and Glassman predicted in 2005, Reg NMS has exacerbated market fragmentation and complexity while at the same time blunting competition and innovation.”).

118. The former American stock exchange now operates as NYSE American. The former Cincinnati Stock Exchange, subsequently renamed the National Stock Exchange, now operates as NYSE National. The former Chicago Stock Exchange now operates as NYSE Chicago. The former Pacific Stock Exchange was acquired by Archipelago Holdings, which now operate as NYSE Arca.

prising four separate equity exchanges) was created in 2005. The Investors Exchange, or IEX, is a stand-alone exchange that began trading in 2016. Three more equity exchanges are in the process of opening. One will be affiliated with an existing family of registered equity options exchanges, the MIAX Exchange Group. Two additional stand-alone exchanges, the Long-Term Stock Exchange, or LTSE, and the Members Exchange, or MEMX, have obtained SEC registration.

As electronic trading has replaced manual trading, the cost of creating a trading platform has fallen, making the market for exchanges contestable.<sup>119</sup> The cost of obtaining regulatory approval, however, remains substantial.<sup>120</sup> Creating a new exchange is also difficult because of a network externality. Traders want to go where there are already other traders. Liquidity attracts liquidity, as the saying goes. Why would anyone connect and pay access and data fees to a new exchange that operates identically to existing exchanges and has, at the outset, minimal trading?

The short answer is that Regulation NMS forces existing exchanges to connect to any newly registered exchange. The SIP must also gather its trade and quotation data and share the revenues generated by the consolidated data feeds. And although the OPR is addressed to trading centers, not brokers, institutional brokers argue that they have no practical alternative but to connect (and pay fees) to every registered exchange.<sup>121</sup> Finally, the major exchange groups have an incentive to maintain any acquired exchange as a separate entity rather than fold it into an existing exchange. As currently structured, each exchange gets a vote in the Equity Data Plans that determine the amount and allocation of data fees.<sup>122</sup> Regulation NMS is therefore part of the reason for the proliferation of exchanges.

---

The former Boston and Philadelphia Stock Exchanges now operate as Nasdaq BX and Nasdaq PHLX, respectively. The latter is an options exchange. Nasdaq also, however, operates a Nasdaq PSX equity exchange. The SEC's web page contains a list of registered exchanges. See Self-Regulatory Organization Rulemaking, U.S. SEC. & EXCH. COMM'N, <https://www.sec.gov/rules/sro.shtml> (last visited Sept. 18, 2020).

119. See Ian Domowitz & Benn Steil, *Automation, Trading Costs, and the Structure of the Trading Services Industry*, in BROOKINGS-WHARTON PAPERS ON FINANCIAL SERVICES 33, 33 (Robert Litan and A.M. Sontomero eds., 1999); see also Albert J. Menkveld, *High-Frequency Traders and Market Structure*, 49 FIN. REV. 333, 334 (2014).

120. See Rauterberg, *supra* note 11 (manuscript at 19).

121. See Alexander Osipovich & Gunjan Banerji, *As Stock Exchanges Multiply, Miami Wants In on the Game*, WALL ST. J. (Mar. 4, 2019, 8:02AM), <https://www.wsj.com/articles/stock-exchange-competition-heats-up-as-miax-eyes-launch-11551704521> (“[L]arge brokers and traders . . . say they are effectively forced by Securities and Exchange Commission rules to connect to each exchange”).

122. The SEC has ordered an amendment that will give each exchange family a single vote. See Order Directing the Exchanges and the Financial Industry Regulatory Authority to Submit a New National Market System Plan Regarding Consolidated Equity Market Data, Exchange Act Release No. 88,827, 85 Fed. Reg. 28,702, 28,729–30 (May 13, 2020).

One might argue this is all to the good. More exchanges mean more competition. Unfortunately, the fragmentation of trading has not produced the degree of trading system innovation and reduction in trading costs that the SEC expected. It has also increased the demand for high-speed communication between exchanges. The various SEC proposals mentioned in the Introduction and described in more detail below demonstrate that the agency is not entirely happy with its creation.

B. *Regulation NMS Creates Questionable Incentives for Trading Centers and Professional Traders*

As U.S. exchanges shifted from manual to electronic order matching, liquidity provision shifted from specialists and traditional market makers to high-frequency trading firms (HFTs).<sup>123</sup> Although there is no universally accepted definition of HFTs, a working definition might be firms that specialize in entering and canceling proprietary orders rapidly using automated processes.

HFTs can trade at microsecond speeds through colocation—placing the hardware running their trading algorithms in close physical proximity to the hardware running the exchanges' matching engines—and through investing in high-speed communications links between trading venues. Exchanges offer, and HFTs subscribe to, high-speed proprietary data feeds that both reach traders faster than the SIP's data and include information that the exchanges do not provide the SIP.

Stock traders have always been early adopters of new communications technologies in the competition to get information first.<sup>124</sup> Informed traders want to trade before others learn the same information or infer it from the pattern of orders or trades. Liquidity providers face a basic tradeoff between capturing the bid-ask spread and leaving themselves open to adverse selection and inventory management risk. The faster they can revise their priced orders in response to new information, the less susceptible they will be to these risks. To the extent HFTs can minimize risk, they can quote tighter spreads, which benefits liquidity demanders.<sup>125</sup> We might think of that as a defensive use of the HFTs' speed advantage.

---

123. Cf. Vincent van Kervel & Albert J. Menkveld, *High-Frequency Trading around Large Institutional Orders*, 74 J. FIN. 1091, 1091 (2019) ("Migration to electronic trading created a new type of market participant: high-frequency traders (HFTs).").

124. See Kenneth Garbade & William Silber, *Technology, Communication and the Performance of Financial Markets: 1840-1975*, 33 J. FIN. 819, 823 (1978) (domestic telegraph); see also *id.* at 826-27 (transatlantic cable).

125. See Jonathan Brogaard et al., *Trading Fast and Slow: Colocation and Liquidity*, 28 REV. FIN. STUD. 3407, 3408-09 (2015) (describing market-maker use of colocation services and resulting improvements in effective spreads). See also Katya Malinova, Andreas Park & Ryan Riordan, *Do Retail Investors Suffer from High Frequency Traders?* 4 (Working Paper, 2018) <https://ssrn.com/abstract=2183806> (finding that Canadian regulatory fee change that reduced HFT increased effective spreads for retail traders).

There is also, however, an offensive use in which HFTs impose adverse selection losses on other traders. For example, when the price of an asset increases on Exchange A, if a given trader can obtain that information and act on it more quickly than others, it can trade against quotations for the same asset that are now stale (that is, do not reflect the new market conditions) on Exchanges B, C, and D. This “latency arbitrage” offers significant profits.<sup>126</sup>

HFT and latency arbitrage do not just exist in U.S. equity markets. However, there is some reason to believe that the U.S. regulatory system encourages more than the socially optimal amount of investments in speed. The more venues there are trading the same assets, the more prizes there are to be won by winning races from one to another as quoted prices change. The association between Regulation NMS and fragmentation, therefore, may also link Regulation NMS to excessive investments in speed.

A separate issue arises from Regulation NMS’s definition of “protected quotation” to include only quotations disseminated under an NMS Plan or, in other words, displayed by the SIP. The SIP exists side by side with proprietary data feeds. Information about revised quotations or completed trades may reach traders through proprietary feeds faster than through the SIP, offering an arbitrage opportunity to the trader that can win the race to a venue displaying a stale price.<sup>127</sup>

Commentators have noted that the SIP displays the same best quotations as proprietary feeds “almost all” of the time.<sup>128</sup> The relevant question, however, is not the duration of arbitrage opportunities, but whether their aggregate magnitude is sufficient to encourage more socially wasteful investment in speed at the margin. The evidence on this issue is mixed.<sup>129</sup>

---

126. See, e.g., Matteo Aquilina, Eric Budish & Peter O’Neill, *Quantifying the High-Frequency “Arms Race”: A Simple New Methodology and Estimates* 5 (Becker Friedman Inst. For Econ. Univ. Chi., Working Paper No. 2020-86, 2020), <https://ssrn.com/abstract=3636323>; Eric Budish, Peter Cramton & John Shim, *The High-Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response*, 130 Q.J. ECON. 1547, 1553 (2015). The latter paper shows that “sniping” of stale quotes is a problem even when traders are all fast. Because messages to the exchanges are processed in the order received, every message to adjust a quote must arrive before any order to trade at the stale price to prevent sniping. Differential speed tilts the playing field in the fast traders’ direction.

127. The SEC’s proposed changes to its market data rules would require SROs to transmit data to the competing consolidators using the same means and at the same speed as the proprietary feeds. See *infra* note 175.

128. See PHIL MACKINTOSH & KA WO CHEN, *THE NEED FOR SPEED IV: HOW IMPORTANT IS THE SIP? KCG TRADING STRATEGIES & MARKET ANALYTICS* 1 (2016).

129. Ding and co-authors find that differences between the SIP data and private data feeds are sufficiently frequent to impose costs on active traders despite their brief average duration. See Shengwei Ding, John Hanna & Terrence Hendershott, *How Slow is the NBBO? A Comparison with Direct Exchange Feeds*, 49 FIN. REV. 313, 323 (2014) (“Although price dislocations have small effects on infrequently trading investors, investors that are continuously in the market can be substantially disadvantaged.”). A recent estimate is that HFTs earn approximately \$5 billion per year globally from latency arbitrage of all types. See Aquilina, Budish & O’Neill, *supra* note 126, at 50.



Any arbitrage at all between the SIP's prices and those on the proprietary feeds is an artifact of regulatory design. It is also impossible to eliminate under the current regulatory framework, as data will always have to travel farther to go from an exchange to the SIP to a trader than directly from the exchange to the trader.

To the extent that Regulation NMS generates "too many" races from one venue to another, it also likely generates "too many" complex order types at those venues.<sup>130</sup> In recent years, exchanges have introduced many new order types beyond the traditional market and limit orders. This, too, is not inherently surprising or problematic. As trading becomes automated, the discretionary decisions that floor brokers once made have to be automated as well. New order types with multiple levels of conditionality can mimic a broker's discretionary decisions whether and when to display, withdraw, or reprice an order.

New order types are also, however, the ultimate in colocation—they build parts of the HFTs' algorithms into the logic of the matching engine itself. And like colocation and proprietary data feeds, the demand for complex order types is likely inflated by the proliferation of exchanges and the resulting multiplication of pathways from one venue to another.

Electronic trading also alters the ways in which large traders attempt to conceal the size of their orders to reduce price impact. In a floor-based system, a large institutional purchaser could leave an order with a floor broker who would "work" the order, disclosing trading interest when the broker believed it could be done without moving prices significantly.<sup>131</sup> Alternatively, the broker could contact a dealer in the "upstairs" market that might be willing to take the other side of the trade at an attractive price if it believed that the institution's trade was not motivated by information.<sup>132</sup>

In an electronic environment, so-called dark liquidity takes the place of these strategies. Dark liquidity refers to trading methods that do not require that the institutional trader reveal its intentions to the rest of the market. It can include internalization by a dealer.<sup>133</sup> In addition, exchanges typically allow non-displayed orders, in other words, bids or offers that sit in the queue but are not included in the publicly-displayed data (and as a result typically have lower ex-

---

130. See Hester Peirce, *Meeting Market Structure Challenges Where They Are*, 43 J. CORP. L. 335, 356 (2018); see also PHIL MACKINTOSH, *DEMYSTIFYING ORDER TYPES 3* (2014) ("Exchange fragmentation is a big part of the order complexity problem.").

131. See Angel, Harris & Spatt, *supra* note 2, at 25; see also Yuk-Shee Chan & Mark Weinstein, *Reputation, Bid-Ask Spread and Market Structure*, 49 FIN. ANALYST J. 57, 60 (1993) (noting that a floor broker uses reputation to signal to specialist that order is uninformed).

132. Another alternative would be "sunshine" trading, in which the large liquidity trader pre-announces the direction and size of its trade as a means of signaling that it is uninformed. See Anat R. Admati & Paul Pfleiderer, *SUNSHINE TRADING AND FINANCIAL MARKET EQUILIBRIUM*, 4 REV. FIN. STUD. 443, 444–47 (2015).

133. See Carole Comerton-Forde, Katya Malinova & Andreas Park, *Regulating Dark Trading: Order Flow Segmentation and Market Quality*, 130 J. FIN. ECON. 347, 347–48 (2018) (describing dealer internalization).

ecution priority than displayed orders).<sup>134</sup> Finally, ATSS can and do choose not to display their quotes publicly, thereby foregoing trade-through protection. They offer a means for investors not to reveal their intentions until they have found a counterparty.

Dark liquidity, like HFTs and complex order types, is not inherently objectionable. It also, however, interacts in likely unintended ways with Regulation NMS. The OPR produces order routing that may not be in the trader's best interests. A large trader may desire to bypass a venue if its best quote is for a small size in favor of a venue with a slightly worse price but a large displayed size as part of a strategy to minimize price impact. Trading on an exchange offering a better price but a small size may tip the large trader's hand.

Institutional buyers can partially alleviate the problem through an "intermarket sweep order" (ISO). An ISO permits a trader to buy (or sell) all the shares available at the NBBO while simultaneously buying (or selling) the shares available on one or more other exchanges at the best prices available on those exchanges, even though inferior to the NBBO.<sup>135</sup> An exchange may execute an order marked as an ISO at its best price even though a better price is available on another exchange.

An ISO alleviates but does not solve the large trader's problem. Only an exchange's best-priced orders are protected for purposes of the OPR. By rule, an ISO executes only against protected orders.<sup>136</sup> If the sizes of protected orders are small in relation to the large trader's needs, the large trader will want to execute against orders at an exchange's second-best price, but those orders may disappear as soon as the ISO is entered. ISOs also impose substantial informational and compliance burdens on the executing broker, making them an expensive means of working an order.

The OPR is therefore likely part of the reason for the proliferation of dark pools.<sup>137</sup> Absent the OPR, it would be easier for large traders to use the "lit," or publicly-displayed, markets without tipping their hands. This, in turn, should result in more liquidity in the lit markets. While dark liquidity has always existed and would exist without the OPR, repeal of the OPR would likely lead to a shift in trading from dark to lit markets, potentially maintaining overall liquidity while enhancing displayed liquidity.<sup>138</sup>

---

134. Davies & Sirri, *supra* note 1, at 166–67.

135. See 17 C.F.R. § 242.600(b)(31) (2020) (defining "intermarket sweep order"); *see also id.* §§ 611(b)(5), (6) (establishing exemptions to Order Protection Rule for intermarket sweep orders and block trades executed simultaneously with intermarket sweep orders).

136. *Id.* § 242.600(b)(31)(ii) (noting that an ISO executes against a "protected" bid or offer).

137. See Marshall E. Blume, *Competition and Fragmentation in the Equity Markets: The Effect of Regulation NMS 9* (Rodney L. White Ctr. for Fin. Rsch., Working Paper No. 02-07, 2007), <https://ssrn.com/abstract=959429>.

138. See Comerton-Forde, Malinova & Park, *supra* note 133, at 349 (finding that a Canadian rule change requiring dark venues to offer price improvement enhanced lit liquidity and had a benign effect on overall liquidity).

HFTs, new order types, and dark liquidity are analogous to strategies or institutions that existed in the manual markets and have important roles to play in automated markets. This is not, however, to say that more is always better. There is reason to suspect that Regulation NMS encourages more of each than is socially optimal.

### C. Regulation NMS Discourages Innovation in Trading System Design

As of the mid-1990s, there was a clear distinction between Nasdaq's quote-driven dealer model and the NYSE's order-driven auction model.<sup>139</sup> In one, investors searched the quotes of competing market-makers and transacted with the one offering the best price. In the other, investors entered limit and market orders to a central auctioneer/dealer who matched orders or provided price improvement by trading for its own account.

This is no longer the case. All of the regulated exchanges now operate electronic limit order books that trade continuously.<sup>140</sup> This would be unobjectionable had the electronic continuous auction emerged as the winner in a competition among different trading systems. The convergence on a single model, however, is the consequence of exchanges' need to operate within the constraints of existing market structure rules. As Harris puts it, "[t]he order handling rules, unlisted trading privileges, Reg ATS, and Reg NMS all helped homogenize trading systems in the United States."<sup>141</sup>

To take an example, Regulation NMS would make it difficult for an exchange to experiment with a periodic call auction during the trading day. Current markets are continuous—as soon as a buy and a sell order can be matched, they are. Continuous markets rely on the willingness of immediacy providers—market-makers in a prior era, HFTs currently—to trade against incoming market orders in return for a spread.

An alternative model is a call auction, in which trades do not execute continuously. Instead, orders are cumulated over time. Periodically, an auctioneer determines a market-clearing price and executes all trades that can be made at that price. A batch auction process is easily automated.

There are plausible (although not conclusive) arguments that batch auctions would be an improvement on continuous trading. For smaller, less liquid stocks, a low-frequency auction, perhaps every hour, could cumulate the trading interest of natural buyers and sellers over time and allow them to interact directly, rather than each trading with an intermediary. For larger stocks, high-

---

139. See JOHN ARMOUR ET AL., *PRINCIPLES OF FINANCIAL REGULATION* 115–16 (2016), for a discussion of the difference.

140. See Application from Edward S. Knight, Exec. Vice President & Gen. Couns., Nasdaq to Hon. Jay Clayton, Chairman, U.S. Sec. & Exch. Comm'n 13 (Apr. 25, 2018), <https://www.sec.gov/comments/265-31/26531-3515735-162293.pdf> ("Currently, all exchanges in the U.S. operate electronic limit order books.").

141. Lawrence Harris, *The Homogenization of U.S. Equity Trading 2* (Univ. S. Cal. Marshall Sch. Bus., Working Paper, 2011) (on file with author).

frequency auctions, perhaps every few milliseconds, could reduce latency arbitrage and other advantages of speed while allowing near-instantaneous reflection of fundamental information.<sup>142</sup>

The OPR would substantially complicate auctions during the trading day. The high-frequency call auction model involves a delay, albeit brief, between order entry and execution. Without regulatory relief, this would mean that the exchange running the auction would forfeit trade-through protection.<sup>143</sup> Transactions following a low-frequency call auction might themselves constitute illegal trade-throughs if a better-priced order arrived at another market shortly before the auction. The relevant exchange would have to incorporate procedures to “clean up” any orders in other markets before executing trades at the auction price, complicating what would otherwise be a simple single-price auction.

The open of the NYSE and Nasdaq operates similarly to a call auction, cumulating orders and executing them at a single opening price. The OPR contains a specific exception for trade-throughs that occur at a single-priced transaction at the open of a trading center.<sup>144</sup> Without obtaining similar regulatory relief, it would be a challenge to comply with the OPR while operating a periodic call auction. No U.S. exchanges currently operate auctions other than at the open or close.

ATs are not subject to Regulation NMS and may change their trading procedures without SEC approval. There is more innovation in trading design among ATs.<sup>145</sup> Some, in fact, operate periodic auctions. This suggests that regulatory constraints deter exchanges from innovating on trading design. They have little incentive to incur the regulatory costs involved because the exchanges capture part of the revenue generated by latency arbitrage through fees for proprietary data and colocation.<sup>146</sup>

The IEX introduced a modest innovation by incorporating a speed bump, or a 350-microsecond delay between order entry and execution, in order to reduce latency arbitrage.<sup>147</sup> One might accordingly conclude that innovation remains possible within Regulation NMS’s constraints. Alternatively, one might note that IEX’s modest innovation delayed and complicated its registration as an exchange. Other trading venues might conclude that they should operate as an ATS unless they are willing to operate identically to the existing exchanges.<sup>148</sup>

---

142. See Budish, Lee & Shim, *supra* note 6, at 5.

143. See Mahoney & Rauterberg, *supra* note 68, at 243–44.

144. See 17 C.F.R. § 242.611(b)(3) (2020).

145. See Rauterberg, *supra* note 11 (manuscript at 15–16).

146. See Budish, Lee & Shim, *supra* note 6, at 2 (“[I]ncumbent stock exchanges’ private incentives to innovate their market designs are misaligned with social interests *because they earn economic rents from the arms race for speed.*”) (italics in original).

147. See Mahoney & Rauterberg, *supra* note 68, at 270.

148. One popular market commentator argued that IEX’s speed bump is not a significant innovation, but rather a variant on the rebate strategies that other exchanges use to lure particular types of traders. See Kurt Dew, *IEX One? IEX Two? The Speed Bump Must Go*, SEEKING ALPHA (June 14, 2017), <https://seekingalpha.com/article/4081500-iex-one-iex-two-speed-bump-must-go>

Absent competition based on different trading systems, exchanges compete for orders based on access fee structures. Exchanges charge fees to brokers who execute trades on their markets. The Access Rule caps those fees but does not keep an exchange from specifying which party (buyer, seller, passive, active) pays the fee. Nor does it prevent an exchange from rebating a portion of the fee to one party or the other.

As a result, there are currently two dominant access fee models known as “maker-taker” and “taker-maker” (or “inverted”).<sup>149</sup> In the first, the active party, meaning the one that initiates the trade via a marketable order, pays a fee. This might be the regulated maximum of three-tenths of a cent per share, known in the business as 30 mils. The passive party, or the one that entered the resting limit order with which the incoming marketable order was paired, receives a rebate, perhaps 25 mils. In an inverted model, the payments are reversed, with the passive party paying the fee and the active party receiving the rebate.

Once the innovation of a rebate was introduced, other exchanges followed suit in order to compete for limit orders. This, in turn, produced additional pricing innovations. One is the tiering of rebates. Exchanges do not give all brokers an identical rebate, but tailor rebates to trading volumes. There is some indication that the tiers have proliferated to such an extent as to become, in effect, individually negotiated fee levels.<sup>150</sup>

The popularity of maker-taker pricing also created an incentive for some exchanges to switch to inverted pricing. Because the broker representing a limit order pays a fee for executions on an inverted exchange (and gives up the potential rebate of a maker-taker exchange), it will post to inverted exchanges when it perceives that the probability of achieving an execution at a maker-taker exchange is low at the order’s current limit price. The broker or its customer in effect pays a fee of less than one cent rather than improve the limit price by a full cent. This is one of the deleterious effects of the current fragmented system for liquidity and price discovery, a point to which I will now turn.

---

(noting that to genuinely innovate, “IEX must do more than manipulate the NMS. It must confront and destroy the NMS.”).

149. See Carole Comerton-Forde, Vincent Grégoire & Zhuo Zhong, *Inverted Fee Structures, Tick Size, and Market Quality*, 134 J. FIN. ECON. 141, 141 (2019) (“The most common model is the make-take fee model . . . . More recently, three exchanges . . . have adopted an inverted fee model . . .”).

150. See U.S. SEC. & EXCH. COMM’N, INV. ADVISORY COMM., RECOMMENDATION REGARDING EXCHANGE REBATE TIER DISCLOSURE at 2 (2020).

D. *Compared to a Consolidated Market, Regulation NMS Discourages Aggressive Orders*

Shortly after the ITS went into effect, an SEC report concluded that it had not produced an improvement in bid-ask spreads.<sup>151</sup> Indeed, a market consisting of multiple venues operating identical trading systems can produce worse, and less informative, quoted prices than a single consolidated market. The reason is that a consolidated market includes a primary (price) and secondary (time) priority rule.<sup>152</sup> Among limit orders at the same price, the one that has been in the system longest is the first to execute.

Time priority creates two important incentives. First, it encourages traders to enter orders early rather than waiting to see what others are doing, thereby promoting price discovery. Second, it encourages them to bid up to (offer down to) their reservation prices. Once a trader puts a limit order into the queue, it cannot jump ahead of others except by improving its price. This incentive for vigorous competition among orders is a central benefit of consolidating trading on a single platform.

In the existing National Market System, nearly every stock trades on nearly every exchange. The OPR imposes a rule of cross-market price priority, but not time priority. As a result, the probability that a limit order will execute is weakly related to the time at which it is entered. Relative to a price/time priority system, the NMS system does not penalize traders for waiting to enter an order. This encourages free riding on the information contained in other traders' orders.

A strategy called quote matching is an extreme form of free riding.<sup>153</sup> Fast traders observe limit orders entered by slow traders and then trade on the same side of the market, recognizing that if prices move against the fast trader, it can simply sell to or buy from, as the case may be, the slow trader at the latter's original quote. Quote matching reduces the returns to investments in information and thereby reduces the informativeness of prices.<sup>154</sup>

Traders in the current market do not have as strong an incentive to improve their prices when they find themselves at the back of a long queue as they would in a consolidated market. If thirteen exchanges are trading a particular stock, and all happen to be quoting the same prices at a given moment in time, then there are thirteen queues of varying lengths. A broker representing an incoming market order would have no reason to prefer one exchange to the other (apart from fee structures). It might therefore make more sense for a limit order

---

151. See U.S. SEC. & EXCH. COMM'N, A REPORT ON THE OPERATION OF THE INTERMARKET TRADING SYSTEM: 1978-1981, at 48-49 (1982); see also Ferrell, *supra* note 103, at 1063-66 (arguing that a guarantee of execution at the NBBO is insufficient to induce aggressive pricing).

152. Other secondary priority rules (such as size priority) are possible, but I will ignore them for the sake of clarity.

153. See LARRY HARRIS, TRADING AND EXCHANGES: MARKET MICROSTRUCTURE FOR PRACTITIONERS 248-50 (2003), for a description of quote matching.

154. See *id.* at 250-51.

trader to search for the exchange at which it will be closest to the head of the line rather than to improve its price.

Alejandro Bernales et al. document precisely such behavior in a European market. They conclude that “Our results suggest that competition in market design, not fragmentation, drives previously documented improvements in market quality when new trading venues emerge; in the absence of such competition, market fragmentation is harmful.”<sup>155</sup>

This is a concrete respect in which Regulation NMS’s linked market is inferior to an actually consolidated market. It is why the SEC initially proposed a central order file recognizing price and time priority.

In principle, the SEC could revise Regulation NMS to require a central order file and impose both price and time priority. This would be, in effect, a CLOB. A CLOB might or might not be a superior system to the existing one depending on the SEC’s ability to act as a public utility regulator. As discussed in more detail in the next subsection, this is not a simple matter.

Another theoretical solution would be to allow traders to quote in continuous or nearly continuous, rather than discrete, pricing increments, thereby eliminating the advantage of being first in line at a given price.<sup>156</sup> At present, the minimum tick size, or price increment, is one cent for most stocks. In principle, an exchange could allow price improvement in extremely small amounts, such as a billionth of a cent, to jump to the head of the line. Each trader could then be in a line by itself at a given price. Price/time priority would become price priority only.

This is not to advocate extremely small tick sizes, but simply to recognize that tick size and priority interact. In any event, Regulation NMS generally bars bids or offers priced in increments less than one cent.<sup>157</sup>

#### E. *Regulation NMS Interferes with Brokers’ Efforts to Serve Their Customers’ Interests*

Absent the OPR, we would expect brokers normally to route customer orders to the venue offering the best price. While price is not the sole component of execution costs, it is a very important one. A broker will nearly always view price as the most important execution attribute for a small, uninformed order. Large orders are more complicated because the cost of execution includes price impact as well as the bid-ask spread. Venues might compete for large orders

---

155. Alejandro Bernales et al., *A Tale of One Exchange and Two Order Books: Effects of Fragmentation in the Absence of Competition* 1 (Sustainable Architecture for Fin. in Eur., Working Paper No. 234, 2018).

156. See Chen Yao & Mao Ye, *Why Trading Speed Matters: A Tale of Queue Rationing under Price Controls*, 31 REV. FIN. STUD. 2157, 2157–58 (2018) (discussing interaction between tick size and time priority).

157. See 17 C.F.R. § 242.612(a) (2020). Nevertheless, fee rebates create an effective system of half-penny pricing. See Yao & Ye, *supra* note 156, at 2163 n.6 (discussing the prevalence of prices being listed at fractions of a cent as result of rebates).

with a structure that permits traders to hide order size until they have found counterparties willing to trade.<sup>158</sup> A broker handling a large order might choose to route a large order there while bypassing a market offering a slightly better price but a small displayed size.

The OPR, however, results in orders being first routed to the market displaying the best price even if this does not minimize execution cost, all things considered. The purpose of the rule, therefore, is not to protect the broker's customer but to protect traders who enter limit orders. In effect, the rule imposes a universal duty to "reward" traders who enter the best-priced limit orders.<sup>159</sup> It thereby interferes with a broker's desire to route orders based on its own customers' best interests.

*F. Regulation NMS Makes the SEC a Public Utility Regulator, a Task for Which it is Poorly Suited*

Under current practices, brokers pay exchanges for access to data and for executing trades. In both instances, Regulation NMS has at best failed to increase the competitiveness of prices and may have reduced it. As a consequence, the SEC has become a public utility regulator, overseeing the prices of both services.

1. Data Fees

As previously noted, exchanges must provide the SIP with their top of book quotations and last transaction prices, also known as "core" data. The Securities Acts Amendments allow the SEC to recognize either an exclusive processor/seller or multiple processors/sellers of the SIP's core data. It also gives the SEC regulatory authority to regulate the fees of any exclusive information processor to ensure that they are fair and reasonable.<sup>160</sup> From the creation of the consolidated quotation system to date, the SEC has chosen an exclusive processor model and therefore regulates fees for core data. Because each exchange is the exclusive provider of its proprietary data, the SEC also has the authority to regulate those prices.

The SEC is not well-suited to be a public utility rate regulator. Its original mandate was to protect investors by improving corporate disclosure practices

---

158. See Harris, *supra* note 107, at 276 ("Large traders therefore prefer market structures that allow them to find parties willing to trade while minimizing the information that they must expose to find these parties.").

159. See Jonathan Macey & Maureen O'Hara, *From Orders to Markets*, 28 REGUL. 62, 68 (2005) ("[T]he SEC has reinterpreted the duty of best execution as a general duty to the markets, rather than as a particularized contractual obligation").

160. See 15 U.S.C. §§ 78k-1(b) (exclusive processor registration requirement), 78k-1(c) (grant of rulemaking authority) (2018).



and deterring fraud and manipulation.<sup>161</sup> Its organization and staffing reflect that mandate. The agency is dominated by lawyers; each of the four current Commissioners and the nominee for the fifth seat (as of July 2020) is a lawyer.<sup>162</sup> The economists on its staff have traditionally been experts in finance, not industrial organization.

The SEC's performance as a rate regulator has been unimpressive. Initially, it simply accepted core data fees negotiated between the exchanges through their captive Plans, on the one hand, and groups representing broker-dealers and institutional investors, on the other.<sup>163</sup> Only under sustained pressure from the D.C. Circuit did the SEC reluctantly begin to question fee levels.

In 1999, as part of a concept release seeking comment on its review process for core data fees, the SEC justified its light-touch stance.<sup>164</sup> Congress had not intended to turn the SEC into a "ratemaking" agency, the release argued, but instead allowed it to adopt a "more flexible approach than ratemaking."<sup>165</sup> The Commission's primary objective was not cost-based pricing but

(1) the wide availability of market information, (2) the neutrality of fees among markets, vendors, broker-dealers, and users, (3) the quality of market information—its integrity, reliability, and accuracy, and (4) fair competition and equal regulation among markets and broker-dealers . . . . [t]he Commission has relied to a great extent on the ability of the SROs and Plans to negotiate fee levels that are acceptable to SRO members, information vendors, investors, and other interested parties.<sup>166</sup>

The SEC took the same approach to proprietary data. Initially, exchanges did not charge for proprietary data. Its primary value was to give large traders "depth of book" information, or information about the prices and sizes of quotations inferior to the current NBBO. The rise of HFTs, however, increased the demand for speed. The exchanges, therefore, began charging for proprietary data, which reaches subscribers more rapidly than the SIP's data.<sup>167</sup>

In 2008, the SEC approved an NYSE Arca rule change imposing a fee for proprietary data. Consistent with its stance on core data, the SEC declined to review the amount of the fee, concluding that competition for orders among

---

161. In addition to its investor protection mandate, Congress more recently instructed the SEC to "promote efficiency, competition, and capital formation." See 15 U.S.C. § 78c(f) (2018).

162. See Davies & Sirri, *supra* note 1, at 148 ("[F]or the most part the SEC tries to stay away from price regulation."); see also *id.* at 150 ("[T]he SEC is a consummately legal body.").

163. See, e.g., *In re Bunker Ramo Corp.*, Exchange Act Release No. 15,372, 16 SEC Docket 285 (Nov. 29, 1978) (approving fees by Options Price Reporting Authority for access to SIAC transactions data for exchange-traded options).

164. See Regulation of Market Information Fees and Revenues, *supra* note 13, at 70,629–30.

165. *Id.* at 70,619 (citation omitted).

166. *Id.* at 70,622.

167. See Application of Sec. Indus. & Fin. Mkts. Ass'n, Exchange Act Release No. 84,432, at 8–9 (October 16, 2018), <https://www.sec.gov/litigation/opinions/2018/34-84432.pdf> [hereinafter SIFMA Application].

trading venues would hold data fees to a reasonable level.<sup>168</sup> The Securities Industry and Financial Markets Association (SIFMA) and a coalition of internet firms challenged the SEC's approval.

In 2010, the D.C. Circuit held that, while the SEC could consider competition among trading venues as a factor in determining whether fees are fair and reasonable, the record did not include evidence sufficient to sustain the SEC's decision.<sup>169</sup> The court faulted the SEC's failure to consider issues that would typically come into play in an antitrust case, such as market definition and demand elasticity.<sup>170</sup> The failure was hardly surprising, as these concepts were not part of the SEC's regulatory vocabulary and equity market structure was not part of the traditional concern of antitrust scholars.

After additional procedural skirmishing resulting from Dodd-Frank Act amendments to the procedures for SRO rule filings, SIFMA's challenge to the NYSE Arca fees returned to the SEC, which consolidated it with a similar challenge to Nasdaq's proprietary data fees. In 2016, an SEC administrative law judge ruled in favor of the exchanges, concluding that broker-dealers' ability to direct orders to the exchange of their choice (within the OPR's constraints) gave them sufficient bargaining leverage to keep the exchanges from charging a monopoly price for proprietary data.<sup>171</sup>

Meanwhile, the SEC had suffered another D.C. Circuit loss in a fee case, this one involving the Options Clearing Corporation (OCC).<sup>172</sup> The court concluded that by deferring to the OCC's view of the reasonableness of its allocation of costs between its members and nonmembers, the SEC "abdicated [its] responsibility."<sup>173</sup>

Facing the prospect of continuous litigation over data fee approvals, the SEC abandoned its light-touch stance. It reversed its administrative law judge's decision in favor of NYSE Arca and Nasdaq, concluding that the exchanges had failed adequately to justify the fee level.<sup>174</sup> It similarly ruled against the OCC, concluding that it had failed to present sufficient evidence supporting its rule changes.<sup>175</sup>

---

168. *Id.* at 1.

169. *See* NetCoalition v. SEC, 615 F.3d 525, 537–544 (D.C. Cir. 2010) (remanding to SEC for further proceedings).

170. *See id.* at 542–43 (noting that the availability of substitutes insufficient to demonstrate competitiveness absent evidence of interchangeability and prices of substitutes and elasticity of demand).

171. *See* Application of Sec. Indus. & Fin. Mkts. Ass'n, Initial Decision Release No. 1015, at 31 (June 1, 2016), <https://www.sec.gov/alj/aljdec/2016/id1015bpm.pdf>.

172. *See generally* Susquehanna Int'l Grp. v. SEC, 866 F.3d 442 (D.C. Cir. 2017).

173. *Id.* at 446.

174. SIFMA Application, *supra* note 167, at 28.

175. *See generally* Order Disapproving Proposed Rule Change Concerning the Options Clearing Corporation's Capital Plan, Exchange Act Release No. 85,121 (Feb. 13, 2019), <https://www.sec.gov/rules/sro/occ/2019/34-85121.pdf>.

The SEC subsequently engaged in a burst of activity with respect both to core and proprietary data fees. In May 2019, its staff issued guidance on fee filings.<sup>176</sup> The guidance makes clear that in the future, exchanges will have to provide detailed evidence to justify increases in their fees for proprietary data. In general, that evidence will consist either of an antitrust-style analysis of the relevant market sufficient to demonstrate competitive pricing or a public utility ratemaking-style analysis of the costs of providing the service. Preliminary data suggest that exchanges will have a difficult time mustering evidence that the demand for their data is highly elastic.<sup>177</sup> If so, the exchanges will have to demonstrate their fixed and marginal costs of providing data and argue about what is a reasonable rate of return.

With respect to core data, the SEC recently abandoned its longstanding preference for exclusive provision of the SIP's data, proposing instead a system of multiple, competing data vendors in hopes that this will reduce the Plans' pricing power.<sup>178</sup> At the same time, it proposed to expand the definition of core data to include some of what is now proprietary data. Should the SEC adopt the proposal, exchanges will have to provide this expanded core data to the competing data vendors for dissemination and sale. As of July 2020, the SEC has not yet adopted the proposal.

The provision for decentralized, competing data providers is an important step toward competitive pricing. Collectivizing even more of the exchanges' data, however, risks making the exchanges less interested in the quality and integrity of that data, which could hamper price discovery.<sup>179</sup>

Most recently, the SEC has ordered the exchanges to submit a revised, consolidated Equity Data Plan to replace the three current Plans.<sup>180</sup> Importantly, the new Plan will no longer be governed exclusively by the exchanges but will include broker-dealer and institutional investor representatives, among others. The governance rules will also be revised so that groups of exchanges, such as CBOE, Nasdaq, and NYSE, will receive a single vote rather than one for each separate exchange within the group. The unstated but obvious objective is to produce core data fees that will be less subject to judicial challenge.

---

176. See U.S. SEC. & EXCH. COMM'N, STAFF GUIDANCE ON SRO RULE FILINGS RELATING TO FEES (2019), <https://www.sec.gov/tm/staff-guidance-sro-rule-filings-fees>.

177. See Ike Brennan, *Are Stock Market Data Fees Higher than the Law Allows?*, FORBES (Sept. 26, 2019, 2:40PM), <https://www.forbes.com/sites/ikebrannon/2019/09/26/are-stock-market-data-fees-higher-than-the-law-allows/>.

178. See Market Data Infrastructure, *supra* note 9.

179. See Supriya Sarnikar & D. Bruce Johnsen, *Cybersecurity in the National Market System*, 6 RUTGERS BUS. L.J. 1, 2–3 (2009) (raising this concern with respect to the collectivization of data generally).

180. See Order Directing the Exchanges and the Financial Industry Regulatory Authority to Submit a New National Market System Plan Regarding Consolidated Equity Market Data, Exchange Act Release No. 88,827, 85 Fed. Reg. 28,702 (May 13, 2020). The three current Plans cover last-sale data, quotation data, and data regarding Nasdaq stocks traded on exchanges. See *id.* at 28,703.

## 2. Access Fees

Exchanges individually determine prices for executing trades. The OPR, however, removes one critical driver of competition, which is consumer choice. In a normal competitive market, a consumer can decide whether it is cheaper, all things considered, to pay a fee to join a membership-only wholesale club like Costco or shop at a grocery store that does not require a membership but charges slightly higher prices.

A broker's choice of trading venue, by contrast, is constrained. The OPR provides that Exchange B may not execute a trade if Exchange A is displaying a better price for that stock at that time. Even if the broker representing a market order would prefer to trade on Exchange B, it cannot do so unless and until Exchange A is no longer displaying a better price. In practical terms, then, a broker wishing to transact immediately in that situation must send the order to Exchange A and incur whatever fee it charges for execution.

This constraint on broker choice gives each exchange more pricing power than it would otherwise have. The SEC has again had to step in as a price regulator. The Access Rule requires that exchanges not unfairly discriminate among traders in granting direct or indirect access to the market.<sup>181</sup> As noted above, it also caps access fees at \$0.003 per share.

That cap appears to be comfortably above the market price of execution services.<sup>182</sup> The SEC may therefore have assumed that competition among venues would hold fees below the cap and the SEC could declare its mission accomplished. However, the exchanges took the Access Rule as a license to move to a nominal fee of \$0.003 and then rebate most of that fee through a maker-taker or inverted fee model.

The SEC accordingly faced criticism for facilitating these fee models.<sup>183</sup> The rebates create new conflicts of interest between customers and their brokers, who typically retain the rebate. Specifically, they create incentives for brokers to route customer limit orders to the market that offers the highest rebate rather than the one that offers the highest probability of execution.

In response to these criticisms, the SEC announced in 2018 that it would run an experiment with alternative fee structures known as the Access Fee Pilot. The Access Fee Pilot would temporarily impose varying caps on access fees and rebates on different traded stocks to assess the effects on market quality and liquidity.<sup>184</sup>

---

181. 17 C.F.R. § 242.610(a) (2020).

182. Budish et al. conclude that the net fee paid for trade execution averages about \$0.0002 per share, or less than a tenth of the regulatory cap. See Budish, Lee & Shim, *supra* note 6, at 4.

183. See, e.g., Robert Battalio, Shane A. Corwin & Robert Jennings, *Can Brokers Have It All? On the Relation between Make-Take Fees and Limit Order Execution Quality*, 71 J. FIN. 2193, 2196 (2016) (finding a “negative relation between take fees and limit order execution quality”); Angel, Harris & Spatt, *supra* note 2, at 39 (“Make-or-take pricing has significantly distorted trading in the National Market System.”).

184. See 17 C.F.R. § 242.610T (2020).

The NYSE, Nasdaq, and CBOE promptly sued the SEC on the grounds that its approval of the Access Fee Pilot was arbitrary and capricious.<sup>185</sup> The D.C. Circuit ruled in June 2020 that the agency lacks the statutory authority to adopt the Access Fee Pilot.<sup>186</sup>

Commentators have noticed the increasing willingness of regulated entities to sue the SEC. As the *Wall Street Journal* put it, “suing a company’s regulator—an uncommon and aggressive tactic—is becoming less taboo as the SEC tries to flex its muscles.”<sup>187</sup> A more accurate way to put the point might be that lawsuits are becoming less taboo now that the SEC can substantially enhance or diminish the pricing power of regulated entities, creating potentially dramatic distributional effects.<sup>188</sup> The SEC is responding with changes to Regulation NMS in hopes that procedural fixes can produce more competitive prices. I propose below that a more fundamental rethinking is needed.

### G. *So What?*

An obvious response to these concerns is that on objective measures, U.S. equity markets serve investors better today than at any time in the past.<sup>189</sup> Why should the SEC change a system that performs its essential functions at such a low cost?

There is scant evidence that the core of Regulation NMS—the separate-but-linked trading environment and supporting features such as the OPR—has much, if anything, to do with the secular improvements in the functioning of U.S. equity markets. Instead, those improvements are largely due to exogenous developments and other regulatory changes.

The fall in retail brokerage commissions cannot be a consequence of Regulation NMS because it is a decades-long phenomenon.<sup>190</sup> Congress’s and the SEC’s decisions to end the fixed commission system in the 1970s, which was

---

185. See Petition for Review at 2, *N.Y. Stock Exch. v. SEC*, No. 19-1042 (D.C. Cir. Feb. 14, 2019).

186. See *N.Y. Stock Exch. v. SEC*, 962 F.3d 541, 546 (D.C. Cir. 2020).

187. Cezary Podkul, *Proxy Advisory Firm Sues SEC Over New Rules*, WALL ST. J. (Nov. 1, 2019, 3:26 PM), <https://www.wsj.com/articles/proxy-advisory-firm-sues-sec-over-new-rules-11572600608>.

188. The SEC action described in the Wall Street Journal article cited above is an example. See *id.* In 2004, the SEC’s staff issued guidance permitting investment advisors to meet their fiduciary obligations by voting shares in conformance with recommendations by third party advisors regardless of certain conflicts of interest to which the advisors were subject. At present, there is a powerful duopoly of proxy advisory firms. The SEC became concerned that these firms were exercising excessive power and walked back its prior guidance. See SEC 17 C.F.R. § 271, 276 (2016). It simultaneously interpreted proxy advisor recommendations as “solicitations” under the proxy rules. See 17 C.F.R. § 241 (2016). The latter interpretation, in particular, threatened the power of the advisory firm duopoly, resulting in the lawsuit.

189. See Angel, Harris & Spatt, *supra* note 2, at 1 (noting that “[v]irtually every measurable dimension of US equity market quality has improved” since the beginning of the century).

190. See *id.* at 16 fig.14 (showing a decrease in retail brokerage commissions).

itself prompted by the rise of institutional investors, initiated a long secular decline in retail brokerage commissions.

Similarly, the fall in bid-ask spreads followed changes in tick size, not the OPR or other commands to the exchanges to more effectively link the markets. Effective bid-ask spreads fell in two discrete steps as the minimum tick size fell, first from eighths to sixteenths, then from sixteenths to decimals.<sup>191</sup> The largest drop occurred after the completion of the move to decimalization (that is, making the minimum pricing increment for most stocks one cent) in 2001.<sup>192</sup> It is also notable that bid-ask spreads for the stocks of small-capitalization companies have not improved in line with those of large-cap companies.<sup>193</sup> This is a small piece of evidence for the proposition that Regulation NMS's one-size-fits-all model may not fit small-cap stocks very well.

The entry of new exchanges in Europe in the mid-2000s was associated with a prompt improvement in market quality and reductions in trading costs.<sup>194</sup> At that time, Europe's regulatory system was transitioning from the Investment Services Directive of the mid-1990s to the Markets in Financial Instruments Directive.<sup>195</sup> It is unlikely that regulatory commands which were not yet effective, and certainly not commands to link markets, were responsible for the rise of competition. Technology and innovation are the more likely causes.<sup>196</sup>

In short, there is ample reason to believe that the SEC could replace Regulation NMS with a simpler system without adverse effects on commissions, bid-ask spreads, or other measures of market quality. Certain regulatory changes—ending fixed commissions, rejecting limits on off-exchange trading, and moving to decimal pricing—reduced investors' costs. Replacing the heavy hand of Regulation NMS with a lighter and simpler set of principles would not undo those changes.

---

191. See Tarun Chordia, Richard Roll & Avanidhar Subrahmanyam, *Liquidity and Market Efficiency*, 87 J. FIN. ECON. 249, 256 (2008) (noting that effective spreads “experienced three distinct regimes corresponding to subperiods for the eighth, sixteenth, and decimal minimum tick sizes”).

192. The SEC in 2000 required the exchanges and Nasdaq to submit plans to price securities in decimal increments, with all listed securities priced in decimals by April 9, 2001. See 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, Exchange Act Release No. 42,914, 65 Fed. Reg. 38,010, 38,013 (June 19, 2000).

193. See Angel, Harris & Spatt, *supra* note 2, at 10 (“The downward trend in spreads, which is so visible for the larger stocks, has not been as uniform for smaller stocks.”).

194. Menkveld, *supra* note 119, at 338–39.

195. The Markets in Financial Instruments Directive was adopted in 2004 with a 2-year transition period. See Directive 2004/39, 2004 O.J. (L 145) 1 (EC).

196. See Albert J. Menkveld, *High Frequency Trading and the New Market Makers*, 16 J. FIN. MKTS. 712, 717 (2013) (“Instinct pre-empted MIFID when it launched Chi-X . . .”).

## IV. MOVING FORWARD

The time has come for a fundamental rethinking of equity market structure regulation. The SEC should repeal Regulation NMS and replace it with a less prescriptive and less intrusive set of design principles. Those design principles should include issuer choice, exchange autonomy, and regulatory consistency.

## A. Issuer Choice

The SEC can and should require that an exchange receive the issuer's consent before it offers trading in a stock. As matters now stand, any exchange that wishes to trade a security may do so by extending unlisted trading privileges (UTP) to that security.<sup>197</sup> In practice, nearly every exchange trades nearly every listed stock.<sup>198</sup> This system reflects Congress's and the SEC's policy judgment that giving exchanges broad authority to trade stocks listed on other exchanges would foster competition and thereby reduce investors' trading costs.<sup>199</sup>

The problem with the policy stance is that we do not know whether dispersing trading among competing markets or consolidating it on a single market maximizes liquidity.<sup>200</sup> The current system assumes that regulators are best placed to make that determination.<sup>201</sup> A better system would recognize that issuers are in a superior position. Although managers of public companies are subject to their own agency problems, they still have stronger incentives than exchanges, broker-dealers, or the SEC to maximize liquidity for their stock.<sup>202</sup>

---

197. 15 U.S.C. § 78l(f) (2018) (noting that "any national securities exchange may . . . extend unlisted trading privileges to . . . any security that is listed on a national securities exchange" subject to certain exceptions).

198. Application from Edward Knight, Exec. Vice President and Gen. Couns., Nasdaq, Inc., to Hon. Jay Clayton, Chairman, U.S. Sec. & Exch. Comm'n (Apr. 25, 2018) (on file with the Sec. & Exch. Comm'n).

199. See, e.g., *Unlisted Trading Privileges, Hearing on H.R. 4535 Before the H. Subcomm. on Telecomm. and Fin. of the Comm. on Energy and Commerce*, 103rd Cong. 3, (1994) (statement of Rep. Fields) (noting that the bill would remove "outdated restrictions" "to ensure that monopolies are not being protected and that competition, not regulation, determines where stocks will trade."); *id.* at 38 (testimony of Brandon Becker, Director, SEC Market Regulation Division) (suggesting that, by streamlining approval process for UTP, the bill would "enhance[e] the opportunity for competition among markets").

200. See Fox, Glisten & Rauterberg, *supra* note 3, at 200–01.

201. See Jonathan Macey & Maureen O'Hara, *Stock Transfer Restrictions and Issuer Choice in Trading Venues*, 55 CASE W. RES. L. REV. 587, 605 (2005) (the SEC "has taken a dim view of issuers' efforts to restrict the trading venue of their securities, once those securities have been listed"). Macey and O'Hara argue that issuers could use share transfer restrictions to consolidate trading on a single venue at the time of an IPO.

202. See Dale A. Oesterle, *Regulation NMS: Has the SEC Exceeded its Congressional Mandate to Facilitate a "National Market System" in Securities Trading?*, 1 NYU J. L. & BUS. 613, 653 n.165 (2005) (noting that issuers might choose trading venues in their personal interests rather than in shareholder interests). While this is undoubtedly correct, it is not a complete answer to whether issuers should be allowed to select a venue. Exchanges are subject to competitive forces, but so are managers (in the labor and capital markets).

The choice between (relatively) consolidated or dispersed trading is likely unimportant for the largest and most heavily-traded stocks. They are popular trading and investment vehicles, meaning that their liquidity is mostly exogenously determined and relatively insensitive to the structure of the market(s) on which they trade.

There is a debate about whether the liquidity of smaller and more thinly-traded stocks is also mostly exogenously determined or whether consolidating their trading on a smaller number of venues could enhance liquidity.<sup>203</sup> Some market professionals argue that small-company stocks that trade on many venues are less liquid than those trading on fewer venues.<sup>204</sup> There is empirical evidence that dispersed trading has a positive effect on liquidity for large stocks but a negative effect for small stocks.<sup>205</sup>

Fortunately, it would be a simple matter to permit issuers to experiment with different levels of consolidated or dispersed trading. The SEC has the statutory authority to require issuer consent as a condition of extending UTP for a given stock.<sup>206</sup> The SEC could also require issuer consent as a condition of trading on ATSS since the statutory provisions governing UTP do not apply to ATSS.

Dealer internalization is not currently regulated as either an exchange or an ATS, so limiting trading to a single exchange would not prevent it. On the other hand, should a smaller issuer choose to have its shares traded on only one exchange, dealers might find it preferable to expose their buying or selling interest to that exchange rather than trying to trade alongside it. In short, the starting assumption should be that internalization will not adversely affect liquidity. Should that assumption prove incorrect, the SEC can address it at a later date.

The latter point is of more general applicability. My arguments throughout are premised on the notion that technology has made the market for trading platforms more competitive than it was when Congress instructed the SEC to create a national market system in 1975. Should the SEC observe specific non-

---

203. See Davies & Sirri, *supra* note 1, at 159 (“Market fragmentation may be a greater concern for small capitalization issuers . . .”).

204. On April 23, 2018, the SEC’s Division of Trading and Markets held a roundtable on market structure for thinly traded securities. See generally *Sec. Exch. Comm’n. Division of Trading and Markets: Roundtable On Market Structure For Thinly-Traded Securities* (April 23, 2018), <https://www.sec.gov/spotlight/equity-market-structure-roundtables/thinly-traded-securities-roundtable-042318-transcript.txt>. Several participants expressed the view that suspension of UTP might enhance liquidity for thinly traded stocks. See *id.* at 73, 97, 113, 233, 235.

205. See Peter Haslag & Matthew C. Ringgenberg, *The demise of the NYSE and NASDAQ: Market Quality in the Age of Market Fragmentation 2* (Working Paper, 2020), <https://ssrn.com/abstract=2591715> (“Our findings present new evidence that the reduced transaction cost effect [of fragmentation] dominates for medium and large-capitalization stocks, leading to improvements in market quality, while the negative network externality effect dominates in small-capitalization stocks, leading to a reduction in trading and market quality.”).

206. Although Section 12(f) of the Exchange Act empowers any exchange to extend UTP to any listed security, the SEC has the authority to impose “additional procedures or requirements” for extending UTP. See 15 U.S.C. § 78l(f)(1)(D) (2018).



competitive practices in the simpler system I outline, it has ample authority to introduce tailored solutions. It need not, however, retain an entire system initially designed to break down the NYSE's walled garden of fixed commissions, off-exchange trading restrictions, and limited access.

### B. Exchange Autonomy

The National Market System requires exchanges to act against their own interests and sometimes those of brokers and traders in pursuit of the SEC's goal of combining the best of competitive and consolidated market structures. Exchanges must maintain an order-routing system, a consolidated tape, and a consolidated quotation system that they did not create for their own purposes and that generate the various problems outlined in Section III.

The entire system should be replaced by one that gives exchanges, and by extension brokers and traders, the autonomy to select their strategies and succeed or fail accordingly. An exchange should be free to select the trading rules and terms of access that it thinks will attract orders from traders and their agency brokers, who in return should be free to trade or not trade on that exchange.

The OPR, Access Rule, and related rules are unnecessary to ensure that brokers can and will search for the best price. To the extent the OPR was intended as a backstop to the broker's duty of best execution, it is expensive overkill. The SEC should offer additional guidance on best execution or step up its enforcement against brokers if it believes they are intentionally failing to seek superior executions for customers.

The OPR's other objective—to reward the limit order trader offering the best price—sometimes conflicts with the objective of best execution. The SEC should concede that its attempt to force market participants to act against self-interest to pursue an abstract notion of fairness to limit order traders is costly and does not achieve its objective of encouraging those traders to quote aggressively.

Because of the significant positive externalities associated with transaction data, exchanges should be required to publish that data in real time (although possibly with a delay for data on transaction size to encourage large traders to trade in lit markets).<sup>207</sup> Given current communications technologies, there is no need for a central processor to consolidate these. Brokers can get feeds directly from exchanges and create their own consolidated tape.

Exchanges should, however, be able to set the terms of access to their quotations rather than selling them collectively through one or more Equity Data Plans. One might argue in opposition to that idea that the market's experience with proprietary data feeds shows that giving exchanges the right to determine fees is a bad idea. Current proprietary data fees are high enough to induce brokers to mount legal challenges. The reason may have to do with network ef-

---

207. See Larry Harris, *What to Do about High-Frequency Trading*, 69 FIN. ANALYSTS J. 6, 7 (2013).

fects. Quotation data from different exchanges are complements, meaning that a broker buying data from one exchange has an incentive to buy from all the others.<sup>208</sup> Competition among exchanges for orders may therefore not ensure competitive pricing for data.<sup>209</sup>

Another possibility, however, is that private data feeds are expensive primarily because they are a “speed technology” that facilitates latency arbitrage.<sup>210</sup> Eric Budish and co-authors offer a model with homogeneous exchanges and fixed entry costs and identify a possible equilibrium in which exchanges share rents with HFTs by charging high prices for data and colocation. Empirically, they estimate that exchanges capture about 30% of rents through data fees.<sup>211</sup> If Budish et al. are correct, then eliminating Regulation NMS would be the sort of regulatory “push” that could spur innovation and eliminate the rents.<sup>212</sup>

Moreover, in a system that gives issuers a choice of trading venues, competition for *listings* may reduce data fees. Given the right to choose where its shares will trade, an issuer would have an incentive to insist on low data fees. Lower costs will mean more brokers connecting to the exchange and therefore, at the margin, more orders submitted and greater liquidity.

Even if the system I outline does not produce competitive data fees, brokers and their customers will be no worse off than they are now. The SEC currently regulates prices for both core and proprietary data. In a world without Regulation NMS and automatic UTP, it might still have to do so—but it might not. In either event, giving exchanges more control over their quotation data will give them stronger incentives to maximize data quality and integrity.<sup>213</sup>

### C. Regulatory Consistency

At the time of the 1975 amendments, exchanges were closed, member-owned organizations whose rules governed not merely the mechanics of trading but the business conduct of their member brokers and the corporate governance and disclosure practices of their listed companies. Since that time, exchanges have demutualized and offloaded most of their role as broker-dealer regulators to the Financial Industry Regulatory Authority (FINRA). Specialists and market makers have been largely replaced by HFTs that do not undertake formal obligations to the exchanges to maintain a continuous market. Meanwhile, the Sarbanes-Oxley Act and the Dodd-Frank Act usurped the few remaining areas

---

208. Lawrence R. Glosten, *Economics of the Stock Exchange Business: Proprietary Market Data 3–8* (Working Paper, 2020), <https://ssrn.com/abstract=3533525>.

209. *Id.* at 2.

210. *See* Budish, Lee & Shim, *supra* note 6, at 2.

211. *Id.* at 3–4.

212. *See id.* at 6–7.

213. *See generally* Sarnikar & Johnson, *supra* note 179.

in which exchanges had regulated the corporate governance practices of listed companies.<sup>214</sup>

There is no longer a good reason to insist that exchanges be SROs.<sup>215</sup> FINRA and the SEC can and should absorb their remaining regulatory role. Necessarily, then, there is no longer a need for trading platforms offering services that are close substitutes to be subject to different regulatory regimes. The lighter-touch approach of Regulation ATS could be extended to all trading platforms.

Trading platforms may currently choose to register as an exchange or register as a broker-dealer and operate as an ATS. ATSS, unlike exchanges, may maintain control over the quotations in their systems. They need not submit their rules for the SEC's approval. The SEC should eliminate the distinction and adopt a simplified and unified regulatory system for all multiple-to-multiple trading markets, meaning any market that allows multiple buyers to negotiate with multiple sellers and that executes the resulting trades.<sup>216</sup> The markets should have broad authority to determine their trading environments and associated rules without SEC approval.

A side benefit of the system I've described is that, by removing SRO status from exchanges, the SEC could make clear that their business practices are subject to antitrust scrutiny on the same basis as any other business. The SEC might identify certain practices, such as any exchange rule or procedure that attempts to prevent or penalize a subscriber from routing an order to another market on which the stock is traded, as anticompetitive. Similarly, any collusion among exchanges in setting fees or other terms would be banned—unlike the current system, of which collusion through the Plans is an integral part.

#### D. *Can We Get There from Here?*

Regulation NMS likely contributed to the proliferation of trading venues and gave exchanges more pricing power. Its replacement might reverse these trends. Some trading venues would see themselves as potential losers in a different competitive environment and would resist change.<sup>217</sup> They would argue

---

214. See, e.g., 15 U.S.C. § 78j-1(m) (2018) (noting that the SEC shall direct SROs to require independent audit committees); *id.* § 78j-3 (noting that the SEC shall direct SROs to require independent compensation committee); *id.* § 78j-4 (noting that the SEC shall direct SROs to require recovery of erroneously awarded incentive-based executive compensation). See also *id.* §§ 7241–7266 (including officer attestation of financial reports, forfeiture of CEO and CFO incentive compensation in event of accounting restatement, management assessment of internal controls, code of ethics for senior financial officers).

215. Cf. Macey & O'Hara, *supra* note 201, at 591–93 (drawing a similar conclusion).

216. See 17 C.F.R. § 240.3b-16(a) (2020) (defining an “exchange” as a multiple-to-multiple facility).

217. See Fox, Glosten & Rauterberg, *supra* note 3, at 201 (“[A]ny attempt to reverse the decision for multiple venues would meet stiff resistance from those who have built businesses based on an assumption that the multivenue structure will continue.”).

that Regulation NMS helped create the markets' current blend of low costs and high liquidity and its replacement would harm investors. While, as noted above, I believe the evidence does not support that argument, it might reinforce regulators' natural tendency to move slowly.<sup>218</sup>

On the other hand, as the SEC is discovering, even incremental changes that interfere with exchanges' pricing power generate massive pushback. Within a month of the SEC's order to the exchanges to revamp the Equity Data Plans, the Nasdaq family of exchanges petitioned the D.C. Circuit for review.<sup>219</sup> Perhaps more fundamental change would be no more painful in the long run.

There are signs that the SEC is willing to consider more than small, incremental changes to Regulation NMS. Commissioner Hester Peirce has argued that "as we progress with further market structure reforms, we should be willing to consider eliminating rules that interfere with—or even foreclose—efficient methods of communication or market interactions rather than imposing additional rules that merely mitigate the effects of prior regulatory choices."<sup>220</sup> The SEC has held multiple roundtable discussions on market structure topics in which industry and academic participants have discussed potential reforms.<sup>221</sup>

The SEC could travel a significant distance with one straightforward rule-making. It could act on my suggestion above and adopt a rule requiring issuer consent before an exchange extends UTP to a stock. The Treasury Department has recommended that the SEC consider permitting UTP suspension for small-company stocks.<sup>222</sup> Extending an issuer consent principle to all stocks would not go much farther, since large companies would likely grant consent routinely. As part of the same rulemaking, the SEC could amend Regulation ATS to require issuer consent before an ATS trades a stock. The rule should also ensure that exchanges do not impose unreasonable burdens preventing an issuer from changing its listing or UTP status as its needs change.

The next priority should be to repeal the OPR. Several of the unintended consequences of Regulation NMS described in Part III above stem from the OPR. Its repeal would facilitate competition in market structure as opposed to the current system in which largely identical markets compete for order flow through complicated pricing structures.

Without the OPR and its resulting mandatory order routing, exchanges could not attract orders without reasonable fees and other terms of access. There should accordingly be no more need for the Access Rule's provisions on

---

218. See Gallagher, *supra* note 3, at 7 (noting "the incrementalism that invariably leads regulators to attempt to solve every problem, however small, in a vacuum.").

219. See Exchange Act Release No. 89,066, 85 Fed. Reg. 36,921 (June 18, 2020) (denying stay pending legislation).

220. Hester M. Peirce, Comm'r, U.S. Sec. & Exch. Comm'n, Remarks before the SIFMA Equity Market Structure Conference (April 18, 2018).

221. See Equity Market Structure Roundtables, U.S. SEC. & EXCH. COMM'N., <https://www.sec.gov/spotlight/equity-market-structure-roundtables> (last modified Oct. 17, 2019).

222. See Mnuchin & Phillips, *supra* note 7, at 60.

fees. Out of an abundance of caution, however, the SEC could continue to require nondiscriminatory access.

The next step would be more disruptive to the current system. That would be to replace the NMS Plan(s) with a rule simply requiring real-time public access to last-transaction data. The exchanges would then gain control over their quotation data. Perhaps this would get the SEC out of the business of regulating prices. Even if it doesn't, the SEC would simply have to continue its current oversight of the prices of proprietary data feeds.

At that point, the SEC would have instituted issuer choice and exchange autonomy. The remaining task would be to free exchanges from their role as SROs and give them similar regulatory treatment to ATSS. Issuer and broker choices, not regulatory mandates, would determine which trading venues and systems will survive.

## V. CONCLUSION

The SEC has disclaimed a desire to dictate the way in which exchanges trade stocks or the fees they charge for their services. By a series of gradual steps, however, the SEC finds itself doing both.

Increasingly, the SEC's incremental changes to its market structure regulations address shortcomings of prior regulatory changes. The SEC could continue down the same path. It could reduce the maximum fee for execution access, require broker-dealers to pass rebates along to their customers, introduce more competition into the Equity Data Plan(s), and require exchanges to provide their proprietary data to the SIP. These changes would respond to some of the most visible unintended consequences of Regulation NMS.

Alternatively, the SEC could step back and ask whether a system that requires such constant recalibration is a good system. I have argued that it is not. It could and should be replaced with a simple set of principles—issuer choice, exchange autonomy, and regulatory consistency. These will allow exchanges to innovate, brokers to focus on their customers' interests, and issuers to pursue stock price maximization through liquidity maximization.