The Governance Gap in Fragmented Markets

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ABSTRACT

Regulation has long relied on securities exchanges to police the flow of capital in the economy. This Article shows that, because of recent regulatory policy, this dependence is deeply misplaced. Theory justifies a powerful governance role for exchanges on account of their capacity to gather a swathe of public companies and traders within their institution. Numbers allow exchanges to match traders, pool information, monitor expansively and to discipline bad actors through exclusion from an essential economic resource. This rationale no longer holds true in modern, fragmented markets. Rather than consolidate equity trading within a handful of exchanges, U.S. equity markets are defined by fierce competition for trades between several exchanges and around 45 less regulated, largely opaque, non-exchange venues. This dynamic raises serious concerns for market governance. First, exchanges face far higher costs for and far lower returns from the effective performance of their governance role. Fragmentation institutionalizes information asymmetries in market structure. It raises monitoring and co-ordination costs to oversee multiple venues. And competition between these venues dramatically reduces the trading volume and profits on offer. Higher costs and lower returns sharpen conflicts of interest already endemic to the notion of relying on for-profit exchanges to oversee their customers. Secondly, an interconnected market of competing venues incentivizes exchanges to underinvest in governance. Expenditure in oversight benefits an exchange privately. But it also confers value on its competitors that can free ride off its efforts. Furthermore, in interconnected, fragmented markets, an exchange can gain by taking risks in providing oversight. It wins by lowering fees and capturing business. However, the full costs of its failure can be externalized and shared across many competing venues. The governance gap in fragmented markets is profoundly damaging for the regulation of capital in the economy. In recognizing the importance of private governance for efficient capital allocation, this Article concludes by exploring the creation of a new liability regime to align the incentives of trading venues more purposively towards better governance.

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INTRODUCTION

Regulators have long relied on exchanges to police the movement of capital in the market. In connecting companies seeking money with investors willing to provide it, as well as offering a space for investors to transact with one another, exchanges constitute focal points for enormous wealth to flow through the economy. The NASDAQ lists the securities of 3,600 companies representing a market value of almost $9 trillion; the New York Stock Exchange (NYSE) hosts 2,500 companies with a market capitalization of $25 trillion.[1] In 2015, the NYSE saw anywhere between

[1] NASDAQ, ACCESS CAPITAL, http://business.nasdaq.com/list/index.html; ICE, NEW YORK STOCK EXCHANGE LEADS IN GLOBAL CAPITAL RAISING FOR FIFTH CONSECUTIVE YEAR, Press Release, http://ir.theice.com/press/press-releases/all-categories/2015/12-15-2015a (Dec. 15, 2015). The NASDAQ began as a simple quotation system and registered with the SEC as a securities information process, rather than an exchange. It only applied to become an exchange in early 2000. See, In the matter of the Application of the Nasdaq Stock Market LLC for Registration as a National Securities Exchange, Exchange Act Release No. 53,128, 71 Fed. Reg. 3550 (Jan. 23, 2006). For discussion see, Roberta Karmel, *Should*

$24 billion to 118 billion worth of trading volume in its listed securities over a single day.[2] The NASDAQ routinely sees over one billion shares trade daily.[3] With this frontline role in raising capital as well as in transferring its risk between investors, exchanges are ideally placed to oversee the market and its users. Unsurprisingly, exchanges have become a lynchpin of the regulatory framework, entrusted with maintaining discipline in the marketplace.[4] By statute, exchanges must assure that those using their services comply with applicable securities laws and corporate governance standards. They hold enormous power to monitor and punish users.[5] In turn, exchanges themselves are subject to an array of rules and state oversight.[6] For securities markets, this interlocking allocation of regulatory responsibility between public and private actors – leveraging the expertise of each – ultimately undergirds a basic economic purpose. A well-regulated marketplace should encourage listed companies and investors to participate – and to utilize capital for productive growth.[7]

This Article challenges the role of exchanges at the center of the governance framework in modern markets. Recent years have witnessed a dramatic transformation in the structure and design of the U.S. marketplace. Major exchanges no longer constitute the central hubs that dominate the flow of trading traffic. Rather, today's market is characterized by a deep fragmentation in the flow of trades, divided between an increasing number of exchanges and exchange-like venues.

Securities Industry Self-Regulatory Organizations be Considered Government Entities, 14 STAN. J. L. BUS. FIN. 151, 163-165 (2008) (examining the history of what eventually became the NASDAQ exchange). For an excellent comparative survey and analysis of exchanges and their regulatory function see, Stavros Gadinis & Howell E. Jackson, *Markets as Regulators*, 80 S. CAL. L. REV. 1239, 1244 (2007) (noting that exchanges in the eight jurisdictions surveyed maintained some self-regulatory function and responsibility in oversight – but with varying levels of intensity of government supervision). See also, Chris J. Brummer, *Stock Exchanges and the New Markets for Securities Laws*, 75 U. CHI. L. REV. 1435, 1452 (2008) ("Stock exchanges are not only venues for trading; they also help regulate the markets they organize.")

[2] NYX DATA, DAILY NYSE GROUP VOLUME IN NYSE LISTED, 2015, http://www.nyxdata.com/nysedata/asp/factbook/viewer_edition.asp?mode=table&key=3141&category=3 (representing volumes in the NYSE group of exchanges); SIFMA, RESEARCH QUARTERLY: FIRST QUARTER 2014, http://www.sifma.org/research/item.aspx?id=8589949350 (Jun. 2014) (in the first quarter of 2014, for example, the NYSE averaged a daily dollar volume of around $41 billion).

[3] NASDAQ, EQUITY MARKET SHARE STATISTICS: DECEMBER 2015, http://www.nasdaqtrader.com/trader.aspx?id=marketshare; SIFMA, *supra* note 2 (discussing quarterly statistics for 2014 with an average daily share volume of 2.2 billion shares in the first quarter of 2014).

[4] David A. Lipton, *The SEC or the Exchanges: Who Should Do What and When? A Proposal to Allocate Regulatory Responsibilities for Securities Markets*, 16 U.C. Davis L. Rev. 527, 527-28 (1983) (analyzing early statements by Judge William O' Douglas suggesting that exchanges held a primary role in market supervision).

[5] *See e.g.*, Exchange Act § 6(b)(1) & (5); Exchange Act § 15A(b)(7), 15 U.S.C. § 78o-3(b)(7) (2000); D.L. Cromwell Inv., Inc. v. NASD Regulation, Inc., 279 F.3d 155 (2d Cir.2002) (criminal sanction arising from the exercise of exchange censure).

[6] *See e.g.* Exchange Act § 6(a), 15 U.S.C. § 78f(b) (2000) (stipulating requirements for any entity that seeks to become an exchange, to include, for example, governance standards for members).

[7] *See discussion infra* Part IA.

In all, commentators estimate that the U.S. market divides its equity trading between 11 public exchanges and around 45 other, less regulated, non-exchange venues.[8] This new design represents a distinct break from the past.[9] Whereas exchanges might once have mediated trades in the securities that they first listed, this business can no longer be taken for granted.[10] Exchanges like the NASDAQ and the NYSE are now forced to jostle with an expanding array of venues to attract investors and related business, meaning that they must compete on two key fronts. First, they must attract primary listings – that is, to host a private company's initial public offering and to bring its securities to the public market. Second, they must compete to attract investors that will trade these securities in the secondary market. Trading in the securities of a listed company is no longer fixed on the exchange that first lists that security. Instead, by regulatory design, these securities can circulate across the many trading venues in the market, with investors able to capture a deal on the platform that offers the best bargain.[11] The impact of this fragmentation on established exchanges is profound. The historic dominance of the NYSE and the NASDAQ is a thing of the past. The NYSE's group of exchanges now handles only around 20% of equity volume on U.S. exchanges – the NASDAQ, approximately 15%.[12] Non-exchange trading platforms, colloquially known as "dark pools," have captured an ever-expanding slice of the pie. In 2015, they saw around 33-34% of U.S. equity trading volume

[8] Maureen O'Hara & Mao Ye, *Is Market Fragmentation Harming Market Quality?* Working Paper, 1 (2009) ("One of the more striking changes in U.S. equity markets has been the proliferation of trading venues."). Sam Mamudi, *Dark Pools: Private Stock Trading vs. Public Exchanges*, BLOOMBERG QUICK TAKE, Aug. 23, 2015, http://www.bloombergview.com/quicktake/dark-pools. Note that these numbers are subject to flux. The IEX trading platform is applying to become an exchange under Section 6(a) of the Securities and Exchange Act. Phillip Stafford & Nicole Bullock, *IEX Applies for Full Exchange Status*, FIN. TIMES, Sept. 16, 2015, http://www.ft.com/intl/cms/s/0/70bba900-5c87-11e5-9846-de406ccb37f2.html#axzz3xrPcQetE. For a current list of exchanges authorized under Section 6 of the Securities and Exchange Act, SECURITIES AND EXCHANGE COMMISSION, EXCHANGES, https://www.sec.gov/divisions/marketreg/mrexchanges.shtml.

[9] O'Hara & Ye, *supra* note 8; Annabella Ju, *A Top Rival of Dark Pools Admits they Do Have a Purpose*, BLOOMBERG, Feb 5, 2015, http://www.bloomberg.com/news/articles/2015-02-05/a-top-dark-pool-rival-concedes-they-have-role-in-stock-markets.

[10] Regulation National Market System Rule 611, Order Protection Rule, 17 CFR 242.611 (2005). Regulation Alternative Trading Systems, 17 CFR 242.301 - Requirements for Alternative Trading Systems (1998).

[11] IEX Trading Alert 023 (Nov. 3 2013), http://www.iextrading.com/trading/alerts/2014/023/; IEX, About IEX, http://www.iextrading.com/about/; Regulation National Market System Rule 611, Order Protection Rule, 17 CFR 242.611 (2005).

[12] NASDAQ, EQUITY MARKET SHARE STATISTICS: DECEMBER 2015, http://www.nasdaqtrader.com/trader.aspx?id=marketshare. NASDAQ Share of U.S. equities for December was around 15%. Its share of trading securities listed on its own exchange was 25% and its share of trading NYSE securities was around 12%. Tape A measures refer to NYSE-listed securities, Tape B to securities listed on regional exchanges and Tape C to NASDAQ listed securities. For discussion, BATS TRADING, MARKET VOLUME SUMMARY HELP, https://www.batstrading.com/market_summary/help/.

in 2015, having seen a month-on-month increase throughout the year.[13] Put another way, non-exchanges intermediate almost as much U.S. equity trading volume on their platforms as the NYSE or NASDAQ put together.

This fragmentation raises serious concerns about the ability of exchanges to perform their all-important governance role in the marketplace. This Article makes two claims.

First, exchanges face an array of new costs in maintaining order and discipline. Theory states that exchanges work best by hosting a large number of users. To strike deals, exchanges bring buyers and sellers together at low cost. Invariably, they benefit from a large number of users ready to be matched. The exchange can pool information, lowering search costs. It an also connect users in accordance with more exact preferences (e.g. as to time, quantity and type of security).[14] Simply stated, exchanges function by generating "network externalities," whereby a large number of users attracts even more investors owing to the benefits of an active and efficient facility.[15] The minutiae of market design are, of course, complex and exchanges can exhibit different design choices.[16] At their core, however, exchanges need numbers to function. Otherwise, investors must deal with the capital cost of being unable to buy or sell because they cannot find a counter party at a reasonable price.

Exchanges also leverage this large number of consolidated users to perform their governance function effectively.[17] Their monitoring power can be deployed to an expansive cross-section of the market, building a broadly informed understanding of its risks and activities.[18] Further, the

[13] Ju, *supra* note 9; TABB FORUM, EQUITIES LIQUIDITY MATRIX, Jan. 15, 2016, http://tabbforum.com/liquidity-matrix; https://www.scribd.com/fullscreen/295992285?access_key=key-eD9kGCLxPJwWFCb4Fssn&allow_share=false&escape=false&show_recommendations=false&view_mode=slideshow.

[14] ALVIN ROTH, WHO GETS WHAT AND WHY? THE NEW ECONOMICS OF MATCHMAKING AND MARKET DESIGN 8-10 (2015). (noting, generally, the need for large numbers for a marketplace. However, Prof. Roth discusses various types of markets depending on the kind of purpose it is designed to fulfill, e.g. organ transplants, student-college matches etc.).

[15] Haim Mendelson, *Consolidation, Fragmentation & Market Performance*, 22 J. FIN. QUAN. A. 189 (1987) (observing the benefits of market consolidation and network externalities for exchanges); Marco Pagano, *Trading Volume & Asset Liquidity*, 104 Q. J. ECON. 579 (1995) (observing network externalities with liquidity likely to flow to markets with higher degrees of consolidation).

[16] Jackson & Gadinis, *supra* note 1, 1278-10 (noting the different models of exchanges and state regulation); Roth, *supra* note 14, 4-10. The NASDAQ and the NYSE, for example, exemplify alternative models. The NASDAQ has traditionally been a "dealer" market in which designated "dealers" for particular securities intermediated the flow of trades.

[17] Jackson & Gadinis, *supra* note 1, 1277-9; Jonathan R. Macey & Hideki Kanda, *The Stock Exchange As a Firm: The Emergence of Close Substitutes for the New York and Tokyo Stock Exchanges*, 75 CORNELL L. REV. 1007, 1007-1007-10 (1990) (analyzing the signaling function of listing and exchange regulation); Paul G. Mahoney, *Exchange as Regulator*, 83 VA. L REV. 1453, 1459-1464 (1997) (detailing the historic evolution of exchange regulation of their members through contract rules as well as checks on conduct and creditworthiness)

[18] George Akerlof, *The Market for Lemons: Quality, Uncertainty and the Market Mechanism*, 84 Q. J. ECON. 488 (1970); Harold Demsetz, *The Cost of Transacting,* 82 Q. J. ECON. 33 (1968); Macey &

exercise of their disciplinary authority matters all the more. With the ability to threaten traders with exclusion from the venue, exchanges wield enormous economic authority to limit access to an essential economic resource. Without the benefit of network externalities available on an exchange, traders must fend for themselves – and suffer the resulting capital costs. As observed by Professor Brummer, power and access to large numbers help exchanges to transmit regulatory policy to a swathe of the marketplace, checking conformity with securities laws and expected standards of behavior.[19]

Fragmentation radically re-shapes this regulatory bargain by sharply reducing the number of users that exchanges access. This bodes ill for governance in a number of ways. For a start, the logistical costs of monitoring and discipline rise sharply. Whereas an exchange like the NYSE might once have seen almost 80% of all trading in its listed securities, this figure now hovers around the 20% mark or less.[20] Clearly, an exchange must work harder to gather information on the traders that cross its floor. Far from simply looking on its own venue, an exchange must monitor and also coordinate with an ever-expanding multiplicity of less-regulated platforms that also see trading in its listed securities. Without such co-operation, an exchange will struggle to determine compliance with core securities rules like those governing fraud, manipulation or insider trading.[21] Indeed, with enormous choice about where to transact – on exchanges or opaque dark pools – traders can be creative in crafting opportunistic, disruptive strategies designed to avoid detection.[22] Where information and co-ordination costs are sufficiently high, exchange enforcement can be selective, confined to obvious and egregious breaches or those whose impact is widely felt. Moreover, the impact of exchange discipline may be weak if traders can simply switch their business to less regulated platforms like dark pools.[23]

In addition, lower volumes of business – and fierce competition between venues – deepen the conflicts of interest inherent in the notion of for-profit exchanges disciplining those that bring them business. It is well-

Kanda, *supra* note 17, 1020-2l; Lawrence R. Glosten & Paul R. Milgrom, *Bid, Ask and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders*, 14 FIN. ECON. 71(1985).

[19] *See in particular,* Brummer, *supra* note 1.

[20] *See sources cited infra* notes 12, 139.

[21] Macey & Kanda, *supra* note 17, 1020-2l.

[22] See, But see, Ananth Madhavan, *Market Microstructure: A Survey*, 13-14 Working Paper (2000) (noting finance studies that suggest that large block trades do not predominantly point to insider trading but that insiders tend to medium size block trades in instances of insider trading); United States v. Sarao, Criminal Complaint U.S. District Court Northern District of Illinois, Case Number 15 CR 75. Feb, 11, 2015 (on the use of orders to undertake a manipulate strategy on the Chicago Mercantile Exchange).

[23] John McCrank, *Luminex 'Dark Pool' Enlists 73 Members Ahead of Trading Launch*, REUTERS. October 4, 2015 (a new off-exchange venue set up by institutional investors and asset managers).

trodden ground that for-profit exchanges represent problematic overseers of the market.[24] After all, why would any rational exchange zealously monitor, discipline and exclude those traders that bring it most business? How much capital can a revenue hungry exchange reasonably invest in building an expensive regulatory apparatus to fulfill a public good? Certainly, exchanges internalize private benefits when those using their venue are well behaved. But their efforts are designed to confer benefits to the market as a whole beyond simply their own institution.[25] This core conflict has never been satisfactorily addressed as exchanges have continued to perform their governance function. Fragmentation, however, imports a particularly pernicious dimension.

Importantly, exchanges now internalize higher costs of oversight while seeing less volume and lower revenues from trading.[26] Facing competition from cheaper, less regulated venues, exchanges have to work hard to win market share. This can lead exchanges to seek revenues more aggressively, by selling a variety of services (e.g. data and technology) and growing thicker commercial relations between themselves and their users. It is widely observed, for example, that exchanges pay rebates on fees to high-volume traders that agree to bring their order flow to the venue.[27] These complex entanglements raise the cost to an exchange of monitoring and punishing misbehaving traders. Not only can an exchange lose trading business, but potentially also interest from their customers in a host of other revenue-generative services. Furthermore, this loss represents a competitor's gain. When a trader leaves the exchange, it can take its business to another platform. In all, the exercise of governance represents a particularly poor business proposition in fragmented markets. In their competing duty to their shareholders and to the public, exchanges appear especially conflicted and maybe unable to satisfactorily achieve either.

Secondly, there is little incentive for trading venues to co-operate to overcome the deficits of fragmentation. Co-ordination and information costs – combined with reduced incentives to enforce discipline – should suggest that trading venues gain by co-operating in the exercise of governance. By pooling information and sharing monitoring costs through co-operation, venues can re-capture the benefits of consolidation, even while competing with one another. Moreover, if traders see an equal intensity of oversight across the national market, they may be less likely to engage in "supervisory arbitrage" between venues.

[24] *See discussion infra* Part I(c)

[25] *See discussion infra* Part I(c).

[26] *See discussion infra* Part I(c).

[27] *See discussion infra* Part [ ]

Still, this Article shows that here is little incentive for exchanges and dark pools in fragmented markets to co-operate in the exercise of governance. Indeed, their incentives may be skewed towards privately underinvesting precisely because they collectively share the risks of failure. The design of the national market encourages venues to compete for private gain but to share the costs of failing to govern properly.

Fragmentation in market design arises because regulation has favored competition as a desired policy objective to reduce the transaction costs of trading.[28] Rather than allow dominant exchanges like the NYSE to consolidate all trading in a security – and reap monopolistic rents from this position – regulation mandates that securities trade where they are the cheapest.[29] Once listed on a national exchange, securities can trade freely across the system of exchanges and dark pools with the goal of allowing investors to execute their trades on the platform that offers the best price or some other advantage sought by the investor.[30] By most accounts, this strategy has worked to reduce the various fees that investors pay as a part of trading.[31] It has also resulted in a deeply interconnected market structure, without which such investor shopping would be impossible.[32] Information must flow freely across the market to advertise the best price for a security. Traders too must be able to move easily across venues to transact where it suits them best. Invariably, as finance scholars note, this means that markets can be powerfully efficient in transmitting information across different venues; they can also be quick in spreading error, fraud and the ill effects of risky governance from one venue to the next.[33]

Two implications arise out of this competitive, highly fragmented dynamic. One, venues can gain by the exercise of lax governance. They can attract business to their platform through the promise of lower fees, less monitoring and discipline. They can also out-compete other venues by

[28] Regulation National Market System Rule 611, Order Protection Rule, 17 CFR 242.611 (2005); Jacob Bunge, *NYSE Adjusts Charges in Bid to Draw Traders*, WALL ST. J., Feb. 3, 2009 (noting that the NYSE lowered charges and increased trading speeds in a bid to attract volume away from off-exchange venues and newer competitors like BATS and Direct Edge exchanges).

[29] On monopolistic rent seeking by exchanges, William G. Christie and Paul H. Schultz, *Why Do NASDAQ Market-makers Avoid Odd-Eighth Quotes*, 49 J. FIN. 1813 (1994) (a significant study impacting the NASDAQ showing that NASDAQ market-makers padded the spreads that they charged investors); Prajit Dutta & Ananth Madhavan, *Competition and Collusion in Dealer Markets*, 52 J. FIN. 245 (1997) (observing collusive pressures in dealer markets like the NASDAQ).

[30] Regulation National Market System Rule 611, Order Protection Rule, 17 CFR 242.611 (2005)

[31] *See e.g.*, Bunge, *supra* note 28.

[32] Yesha Yadav, *the Failure of Liability in Modern Markets*, VA. L. REV. (forthcoming (2016)) (analyzing the effectiveness of the liability framework to protect markets from some of the risks of algorithmic trading))(hereinafter, "*Liability*").

[33] Austin Gerig, *High-Frequency Trading Synchronizes Prices in Financial Markets* (Nov. 2015).

generating sufficient business to spur network benefits that can further lower transaction costs. And two, this market structure offers ample motivation to exercise risky governance because – in contrast with a more consolidated structure – venues in a fragmented market do not necessarily internalize the full costs of their failure. Rather, within an interconnected market, risky venues can partially externalize the costs of their sub-optimal oversight to others. For instance, if a Trader engages in unchecked price manipulation on Venue A, information about these bad prices transmits to Venues B, C and D, that can then see trading off these prices. Venue A can win business by attracting the Trader to its floor by promising, lower fees, less intense monitoring and punishment. In short, Venue A can take higher risks than it might otherwise have done in a consolidated market because some of the impact of the Trader's bad acts will spread to other venues rather than be fully internalized by Venue A. Owing to these dynamics, in fact, exercising robust oversight makes little sense for individual platforms. Venues within an interconnected market, where risks spread easily from one to the next, can still lose even if they take needed precautions. If venues are periodically paying for someone else's risk taking, because they are impacted by the bad behavior of others, it makes sense to also take some risks themselves from time to time.

With market structure essential to capital allocation, this Article advocates for a deep re-thinking of the increasing fragmentation that characterizes modern securities trading. It begins by unpacking the implications of returning to a more consolidated market structure. There may be benefits to this approach, particularly in forcing exchanges to reap more fully the gains and losses of their governance. On the other hand, consolidation may well have become something of a relic. After a decade, investors are now used to lower costs in trading. They might value the enormous choice available. With this in mind, this Article seeks to foster greater "economic consolidation" by crafting stronger liability levers for exchanges and dark pools within in the national market.[34] As a first step, this Article suggests bringing fuller liability to bear on exchanges and dark pools for their governance failures. Building on earlier writings, this Article outlines a design for a new liability regime for exchanges and ATS to address the governance costs of fragmentation. The rationale underlying greater liability for trading venues is straightforward. Beyond simply gaining from the competitive market through risk taking, liability can better ensure that exchanges and dark pools have a real economic stake in the safe and reliable operation of the marketplace.

[34] Yadav, *Liability*, *supra* note 32. This Article builds on reform proposals I have outlined in *Liability* to address the costs of trading errors arising in the context of algorithmic trading.

This Article proceeds in five Parts. Part I sets out the critical role played by exchanges in market governance. It connects the significance of this goal with the broader policy objectives of ensuring that capital is efficiently allocated through securities markets. Part II examines the modern turn towards market fragmentation, illuminating the exchange and off-exchange venues that have come to thrive as loci for trades. It highlights the force of competition as a key policy objective of fragmented market design. Part III unravels the implications of market fragmentation and competition for conventional theories of exchange governance and capital allocation. Part IV proposes ideas for reform. Part V concludes.

I. EXCHANGES, GOVERNANCE AND CAPITAL ALLOCATION

Exchanges constitute the backbone of modern securities markets. In providing an organized space for traders, exchanges bring market participants together to transact, pool information and to monitor one another in accordance with an agreed-upon set of rules.[35] Market design constitutes a central preoccupation of scholars as well as policymakers.[36] This attention is richly deserved.[37] Exchanges act as conduits for capital, enabling its transfer from investors to businesses looking to utilize it for growth. This Part outlines the role of an exchange in capital allocation. In doing so, it examines the exchange's central economic functions and its role in market governance, highlighting the many ways in which exchanges utilize their position as intermediaries of capital to organize, regulate and discipline markets.

A. Capital Allocation without Exchanges

[35] Andreas M. Fleckner & Klaus J. Hopt, *Stock Exchange Law: Concept, History & Challenges,* 7 VA. L. BUS. REV. 513 (2013) (providing a history of the evolution of the stock exchange and regulation undergirding their function).

[36] MICHAEL LEWIS, FLASH BOYS: A WALL STREET REVOLT (2014); SCOTT PATTERSON, DARK POOLS: THE RISE OF THE MACHINE TRADERS AND THE RIGGING OF THE STOCK MARKET, 322-333 (2013). Regulators have launched widely publicized actions on issues of microstructure, Keri Geiger & Sam Mamudi, *High Speed Trading Faces New York Probe into Fairness*, BLOOMBERG. Mar. 18, 2014; Kara Scannell & Nicole Bullock, *SEC Fines NYSE Euronext $4.5m for Breaking Rules*, FIN. TIMES, Jan. 9, 2013.

[37] *See e.g.*, O'Hara & Ye, *supra* note 8; Madhavan, *supra* note 22 (for a literature survey on some aspects of market design). For a discussion of the literature, Gadinis & Jackson, *supra* note 1. On the international regulation of exchanges, see, Brummer, *supra* note 1.

Markets are designed to transfer capital from investors holding a surplus to those businesses that can best use this wealth to fuel growth. A range of costs can impede the realization of this goal. First, information is necessary to understand and value the risks of investing; and secondly, the risks of this capital must be transferable at low cost to motivate investors to enter the market.[38]

Information: Companies raise money by issuing securities such as a share or a bond. These securities confer a bundle of rights on investors, notably an entitlement to claim some share of a company's future earnings, through a dividend in the case of equity, or a fixed portion of its cash flows in the case of a bond.[39] In deciding how much capital they should place at risk, investors need information to determine the likelihood of actually receiving the entitlements that they have been promised. This data helps investors to "price" the claim.[40] In the example of equity, a company with strong credentials – likely to generate future cash flows for investors – should command a high price per share. Conversely, a risky profile will prompt rational investors to reduce what they pay for claims, such that they will "discount" what they invest to reflect observable risks.[41] Ideally, a promising company wishes to minimize discounting, seeking to capture as much capital from investors as it can get (and deserves). In turn, investors receive an entitlement to cash flows that reflect their desired return on capital. Capital is allocated most effectively when issuers can secure its fullest value, discounted to precisely reflect its riskiness.[42]

Trading Costs: But investors can also be put off by the logistical and economic costs attached to purchasing and trading a security. Rationally, investors should discount what they invest in response.

Importantly, those that purchase securities do not always wish to hold these investments on an open-ended basis. They would like to be able to exit at an opportune moment, transferring the risk to another investor that wishes to assume it and recovering the capital they have left in the

[38] Zohar Goshen & Gideon Parchomovsky, *The Essential Role of Securities Regulation*, 55 DUKE. L. J. 711 (2006) (arguing that information generation constitutes a central imperative of securities regulation and that encouraging information traders ought to be goal of the regulatory framework); See also, Zohar Goshen & Gideon Parchomovsky, *On Insider Trading, Markets, and "Negative" Property Rights in Information*, 87 VA. L. REV. 1229 (2001) (examining insider trading laws and proposing an allocation of informational benefits to information traders).

[39] FRANKLIN ALLEN, RICHARD BREALEY & STEWART MYERS, PRINCIPLES OF CORPORATE FINANCE, 45-104 (10TH ED) (2011) (describing the salient features of key security instruments and their valuation).

[40] FRANKLIN ALLEN, RICHARD BREALEY & STEWART MYERS, *supra* note 39, 74-85.

[41] FRANKLIN ALLEN, RICHARD BREALEY & STEWART MYERS, *supra* note 39, 74-85. For a summary on valuation and risk discounting, see, for example, Aswath Damodaran, *Equity Risk Premiums, Determinants, Estimations and Implications*, 11-14 (2013).

[42] Damodaran, *supra* note 41.

venture. If investors are unable to trade their risks, or where this transaction becomes too expensive, investors should discount the capital they invest in response to the risk of being locked-in to the consequences of a single decision. Ultimately, the absence of secondary trading hurts companies seeking capital. When investors reduce what they are willing to put into the market because of the high costs of on-selling their risk, businesses that need capital face a shallower pool of investors to access.[43]

Investors that wish to buy or sell securities in the secondary market face a number of expensive logistical hurdles. For a start, they must find each other. This is not always easy. An investor wishing to sell 100 shares of Public Company must seek out another investor that is willing to enter into the other side of this transaction. Searches are a problem where investors are dispersed and whose trading intentions are not made explicit. In addition to simply finding a like-minded contract party, traders must also be prepared to face negotiation costs in reaching a bargain. Such discussions may be time consuming, necessitating legal input and subject to the caprices of uneven bargaining positions. Pervasive search and negotiation costs will likely slow down the pace of secondary trading, increasing further the cost of capital in the marketplace.[44]

The terms of the trade are far from certain even when an investor can locate a contract party wishing to enter a deal. In particular, parties have to be able to rely on each other to perform. Once a bargain is struck, each party is generally expecting the other to honor its terms. For example, a seller of Public Company shares might need the money to meet an immediate cash need. Even if the seller enters into a contract with a buyer to sell these shares, there is no guarantee that a buyer will perform. Where the buyer can find a better deal elsewhere before the shares and cash finally change hands, she still retains an incentive to defect. The possibility of a trader unexpectedly breaching her contract reduces the reliability of the market as a whole, potentially warranting further discounting of capital by investors to reflect this added riskiness of trading.[45]

In deciding whether another market participant is likely to follow through on their end of the bargain, traders also need to invest in verifying the integrity of their proposed contract party. No one wants to enter into large dollar trades with thieves, liars or cheats. Financial credibility is also important. Traders will be wary of those whose creditworthiness is suspect or those lacking the financial resources to follow through on the deal -

[43] Damodaran, *supra* note 41.

[44] Craig Pirrong, *A Theory of Financial Exchange Organization,* Working Paper (1999) (noting the problems of bilateral dealings in the securities marketplace).

[45] On counterparty risk, Craig Pirrong, *the Economics of Central Clearing: Theory and Practice*, ISDA Discussion Paper Number 1, 2-7 (2011).

either not having the securities they propose to sell or not having enough money to pay for securities they wish to purchase. Problem traders who are repeat players pose a systematic risk to honest participants. If investors are forced to investigate the bona fides of every contract party, they are likely to be wary of frequently entering the marketplace, or may reduce the money they bring to it each time.

Search costs and concerns about the riskiness of contract parties point to fundamental tensions arising in a trading system that leaves economic relationships to be regulated informally between two players.[46] Traders might only reveal information on trades and prices on an *ad hoc* basis, leaving swathes of the market without a reliable reserve of data with which to value securities and issuer companies.[47] This lack of transparency can also allow room for problem traders to flourish. In the absence of disclosure and oversight, a single trader can create larger risks than she can manage, forcing the market to bear the consequences of her failure.[48]

Bilateral economic relationships, then, can prove problematic for capital markets. In an environment where private discipline constitutes the primary means of securing good conduct by traders, the costs of self-protection can create a barrier to entry for potential market participants. In other words, securities trading can become the preserve of deep-pocketed, powerful traders who either have the means to enforce discipline from others, or who can stand to absorb the risks of externalities created by badly behaved peers. Capital markets and their ability to allocate capital can suffer deeply as a result. As Professors Gilson and Kraakman famously observe, markets work best where they play host to a heterogeneous mix of traders, large and small, informed and uninformed, whose interactions

[46] The market for over-the-counter swaps provides an example of a market where trading has been undertaken bilaterally between sophisticated parties. From 2001, legislation provided space for traders to transact in swaps essentially outside of federal oversight and relying on industry conventions to maintain economic bargains. This market has been widely criticized as generating large risks for the financial system owing to a lack of transparency, ad hoc risk management and contributing to the global financial crisis in 2007-8. For discussion and analysis of this bilateral market, Bushan Jomadar, *The ISDA Master Agreement - The Rise and Fall of a Major Financial Instrument* (Westminster Business School, Working Paper, 2007); Atlantic Council Divergence Report, 29-31 http://www.atlanticcouncil.org/images/publications/Danger_of_Divergence_Transatlantic_Financial_Reform_1-22.pdf.; For a discussion on the private regulation of risk, Randall S. Kroszner, *Can the Financial Markets Privately Regulate Risk? The Development of Derivatives Clearinghouses and Recent Over-the-Counter Innovations*, 31 J. MONEY, CREDIT & BANKING 596, 598–606 (1999).

[47] The literature on private ordering is extensive. See, for example, Lisa Bernstein, *Merchant Law in a Merchant Court: Rethinking the Code's Search for Immanent Business Norms*, 144 PA. L. REV. 1765 (1996) (examining the effectiveness of private monitoring and adjudication mechanisms in the grain industry); Barak D. Richman, *Firms, Courts and Reputation Mechanisms: Towards a Positive Theory of Private Ordering*, 104 COLUM L. REV. 2328 (2004) (offering a taxonomy of private ordering models) Oliver E. Williamson, *Economic Institutions: Spontaneous and Intentional Governance*, 7 J. L. ECON, & ORG. 159, 167–171 (1991) (examining reputational sanction as a source of private discipline.).

[48] LAWRENCE HARRIS, TRADING AND EXCHANGES: MARKET MICROSTRUCTURE FOR PRACTITIONERS, 3-8 (2003).

generate the information needed to convey a fuller understanding of what public companies are worth.[49] If markets are too hostile for all but a handful of the most hardy of traders, their ability to foster a rich interplay between market participants deteriorates markedly.[50] Capital allocation suffers in two important ways: (i) companies seeking capital have access to a smaller pool of investors; and (ii) information on these companies becomes shallower as well as distorted where prices reflect a slew of complex transaction costs.

B. Network Externalities and Informational Gains

Exchanges institutionalize efforts by securities traders to collectively reduce these information, disciplinary and transaction costs inherent in bilateral trading.[51] First, exchanges set ground rules for the companies that wish to list their securities on the venue, ensuring that they conform to standards of robustness and organizational viability.[52] This helps to assure investors that companies issuing claims to the public generally possess the reserves to make good on their promises. Secondly, an exchange brings together leading financial institutions to trade these listed securities with one another in accordance with set rules for the institution.[53] In return for signing up to terms, a firm can gain access to an organized venue to trade for themselves or for their clients. Traditionally, by law as well as historical precedent, exchanges have limited entry to their venues to leading firms with demonstrated expertise in matching investors with one another ("brokers") as well as in purchasing securities

[49] Ronald Gilson & Reinier R. Kraakman, *The Mechanisms of Market Efficiency*, 70 VA. L. REV. 549 (1984) (analyzing information efficiency and the process of generating efficient prices); Ronald J. Gilson & Reinier R. Kraakman, *The Mechanisms of Market Efficiency: Twenty Years On*, Discussion Paper (2003); Ronald J. Gilson & Reinier Kraakman, *Market Efficiency after the Financial Crisis: It's Still a Matter of Information Costs*, Columbia Law and Economics Working Paper No. 470 (Feb. 2014) (arguing that market efficiency constitutes the best, albeit imperfect, proxy for understanding the real value of companies); See also, James Dow, Itay Goldstein & Alexander Guembel, *Incentives for Information Production in Markets where Prices Affect Real Investment Decisions*, Working Paper (2010).

[50] On information efficiency, see discussion *infra* Part I(A).

[51] Pirrong, *supra* note 44, 2-5.

[52] Onnig Dombalagian, *Demythologizing the Stock Exchange; Reconciling Self-Regulation and the National Market System*, 39 U. RICH. L. REV. 1069, 1072-79 (2005); Roberta Karmel, *The Future of Corporate Governance Listing Requirements*, 54 SMU L. REV. 325 (2001).

[53] Karmel, *supra* note 1, 159-60 (noting that origins of the New York Stock Exchange from 1792 when it was established following high volatility in the nascent U.S. government securities market). The NYSE was initially formed by 24 brokers pursuant to the Buttonwood Tree Agreement. For a collection of key sources describing the history of the NYSE, see, Ellen Terrell (ed), History of the New York Stock Exchange, https://www.loc.gov/rr/business/hottopic/stock_market.html (Oct. 2012).

for their own books ("dealers").[54] Firms that can match buyers and sellers of securities, as well as those ready to put their own money on the line to facilitate trade, help generate volume for the exchange.[55] Broadly, these two functions define the core functions of an exchange in the economy.

Network Externalities: Exchanges seek to capture and build networks of traders and information to allocate capital more efficiently. Exchanges function best by bringing a large number of qualified traders to their floor. The more traders an exchange can attract, the more easily these actors can conclude bargains and transact in information. For an exchange, more business should also mean more profit. A solid profit margin should enable exchanges to reduce fees and to use these lower charges to attract even more traders to the floor, fueling further this growth cycle.[56]

Finance scholars have long recognized the significance of these network effects for anchoring the economic functions of the exchange.[57] First, as Professor Madhavan observes, network effects help exchanges become better at what they are supposed to do: to match buyers and sellers of securities quickly and cheaply. An exchange that is home to more traders will likely find it easier to fulfill this core purpose. Exchanges with a larger volume of users are likely to showcase richer liquidity – the ability of traders to enter and exit an investment rapidly and cost-effectively.[58]

The promise of liquidity should attract expert traders who can help markets become even more effective at their job. Exchanges promising a steady volume of investors should appeal to expert dealers – firms that use their own money to buy and sell security rather than just brokering deals for others.[59] Dealers make markets more liquid by offering a ready, reliable counterparty for investors and for smoothing out the vagaries of demand

[54] Exchange Act § 6(a)(3), 15 U.S.C. § 78f(a)(3) (2000); Exchange Act § 15A(b)(4), 15 U.S.C. § 78o-3(b)(4) (2000). For discussion, Onnig Dombalagian, *supra* note 52, 1072-79; Karmel, *supra* note 1, 160-163. On the role of dealers in maintaining market liquidity and pricing, see, Yakov Amihud & Haim Mendelson, *Market Making and Inventory*, 8 J. FIN. ECON. 31 (1980) (detailing the function of dealers on the market, who buy and sell on their own account to maintain market liquidity); Katrina Ellis, Roni Michaely & Maureen O'Hara, *The Making of a Dealer Market: From Entry to Equilibrium in the Trading of Nasdaq Stocks*, Working Paper, available at, http://forum.johnson.cornell.edu/faculty/michaely/Michaely.pdf.

[55] Macey & Kanda, *supra* note 17, 1012-13 (noting that liquidity refers to the ability of traders to buy or sell quickly at a price connected to available information in the market).

[56] Mark Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 CAL L. REV. 479 (1998) (describing network effects and their increasing analytical significance in judicial decision-making).

[57] For a summary, Madhavan, *supra* note 22, 23-24.

[58] The definition of liquidity in finance is notoriously problematic and complex. See, Macey & Kanda, *supra* note 17, 1012-14; Bengt Holmstrom and Jean Tirole. *Market Liquidity and Performance Monitoring*, 101 J. POL. ECON. 678 (1993) (noting the significance of higher liquidity in securities markets for scrutinizing public companies).

[59] Amihud & Mendelsohn, *supra* note 54; Harold Demsetz, *The Cost of Transacting,* 82 Q. J. ECON. 33 (1968) (on the significance of intermediation).

and supply. For these expert dealers, liquid markets represent a lucrative source of profit. By taking a sliver of gain from the difference between the prices to buy and sell Public Company's securities (the "spread"), dealers make reliable gains by intermediating trades during the day. Dealers and exchanges can, in fact, mutually benefit from each other. Exchanges win if they can host dealers willing to maintain the smooth flow of trades and to prevent sudden spikes and crashes in demand and supply. In turn, dealers gain if they can transact on busy venues, capturing steady profits from the liquidity available on major venues.[60] Exchanges like the NYSE have historically contracted with designated dealers for the provision of "market making" services. Dealers agree to supply liquidity to the exchange in return for fees as well as the opportunity to enhance their own business.[61]

Secondly, deep liquidity can enhance the appeal of markets to a broad and diverse mix of the investor community. Rather than just bringing the toughest, most resourced investors onto the floor, liquid, reasonably priced markets should encourage a wider cross-section of investors to enter the arena. Scholars observe that markets work most informatively when they attract a variety of trading perspectives. As outlined by Professors Gilson and Kraakman, an efficient mix of traders comprises: (i) informed traders; (ii) derivatively, secondarily informed traders; (iii) uninformed traders; and (iv) generally informed traders. Briefly stated, informed traders comprise those that invest in research and analysis of capital markets to impart new, fresh information into prices. In addition to informed traders, the market also includes those that copy informed traders, shadowing their trading patterns and extracting gains from the intelligence of informed actors. Importantly, these copycats can help new insights enter the market more fully, particularly if informed traders do not have enough money to buy or sell as much as they could to convey the force of their information. Uninformed traders comprise those who might enter the market to get cash quickly, those whose depth of data and intelligence is less than what they might think or those who are simply wrong about the market. Like uninformed traders, universally informed traders know only as much as the market does. They will not move markets with their trading, but their presence is much needed to bring

[60] Hendrik Bessembinder, Jia Hao & Michael Lemmon, *Why Designate Market Makers? Affirmative Obligations and Market Quality*, Working Paper (2011).

[61] New York Stock Exchange, *Inside the NYSE*: *The Specialist*, http://www1.nyse.com/pdfs/specialistmagarticle.pdf; New York Stock Exchange, *Designated Market Makers*, https://www.nyse.com/publicdocs/nyse/listing/fact_sheet_dmm.pdf. The NASDAQ operates as an exchange comprising dealers that are each responsible for maintaining a market in specific securities that are listed on the NASDAQ. On the NASDAQ dealer system, Katrina Ellis, Roni Michaely & Maureen O'Hara, *The Making of a Dealer Market: From Entry to Equilibrium in the Trading of Nasdaq Stocks*, Working Paper, Working Paper, available at, http://forum.johnson.cornell.edu/faculty/michaely/Michaely.pdf.

liquidity to the market. Without them, informed traders would not easily find trading partners. Moreover, as Gilson and Kraakman suggest that these uninformed and generally informed traders – coming from a variety of perspectives – might blunt biases in the marketplace.[62]

Network effects can be beneficial for market quality and exchange performance. As Professor Madhavan notes, if a market includes more traders, then its fraction of informed traders as a proportion of the overall number of traders should fall. This is because, proportionately, a small set of informed traders will likely operate in a market comprised largely of uninformed actors. As Madhavan posits, this dynamic can be beneficial. It provides an incentive to informed traders to engage in trading, knowing they will win against lesser informed actors.[63] Dealers too should be more forthcoming. Market makers can make money from uninformed traders and will have an incentive to manage liquidity more willingly.[64]

Information Gains: Network effects also help make markets better at lowering the costs of acquiring and disseminating information. Fewer information costs should encourage investment and reduce discounting.

First, a large cohort of economically diverse, heterogeneous traders – led by informed investors – should help make markets more efficient at reflecting a swathe of information. In the now classic account, theory holds that markets are efficient when they reflect publically available information in the prices at which securities trade.[65] By this account, new information on a security changes its price. The faster prices adapt to reflect emerging information on a company's securities, the better a market's overall efficiency.[66] Prices can offer investors an easily understood, low-cost window into what the market broadly believes a

[62] Gilson & Kraakman, *Mechanisms, supra* note 49; For further discussion, Yadav, *Liability, supra* note 32.

[63] Madhavan, *supra* note 22, 23-24.

[64] Lawrence R. Glosten, *Insider Trading, Liquidity and the Role of the Monopolist Specialist*, 62 J. BUS. 211 (1989) (a seminal article articulating that market makers transact as uninformed traders and lose money to informed actors).

[65] Eugene F. Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. FIN. 383 (1970) ("a market in which prices always 'fully reflect' available information is called 'efficient'). The literature in this area is vast. The efficient capital markets hypothesis has proven controversial, for example, by those that lament its lack of explanation of irrational human behavior as an aspect of the price formation process. See, for example, ANDREI SCHLEIFER, INEFFICIENT MARKETS: AN INTRODUCTION TO BEHAVIORAL FINANCE (2000). Lawrence H. Summers, *Does the Stock Market Rationally Reflect Fundamental Values?*, 41 J. FIN. 591 (1986) In the legal literature see, e.g., Lynn A. Stout, *The Mechanisms of Market Inefficiency: Introduction to the New Finance*, 28 J. CORP. L. 635 (2002).

[66] Recent literature has focused on the use of high-speed algorithms as drivers of increasing efficiency, showing that these can help bring information to the markets more quickly. See, for example, Jonathan Brogaard, Terence Hendershott & Ryan Riordan, *High Frequency Trading and Price Discovery* (European Central Bank Working Paper Series No. 1602, 2013). For discussion, Yesha Yadav, *How Algorithmic Trading Undermines Efficiency in Capital Markets*, 68 VAND. L. REV. 1607 (2015) (suggesting that algorithmic trading increases information efficiency in the short term but may undermine long term capital allocative efficiency).

security is worth – its fundamental value. By aggregating store of public information into an indicator of present worth, the price should include insights about a company's true value.[67] While far from exact – as prices only reflect current information – they can still offer a rough-and-ready measure of fundamental value.[68]

Exchanges that introduce a swathe of actors into the price formation process can help enhance informational efficiency – and capital allocation. Deep liquidity, an active cohort of market makers, as well as a familiar trading environment, can incentivize the interaction of informed and other traders. This interplay should generate a more exact price, reflecting the information that these diverse traders bring to the floor. In turn, a richly informed market can facilitate capital allocation.[69] Rather than requiring each investor to pay for research and analysis into basic information, prices can fill the gap at low-cost. With prices reflecting information that the market already knows, investors can focus their resources on discovering new insights that can modify prices to reveal useful viewpoints on company function. Where prices offer precise predictions of future cash flows, investors should be able to more carefully direct money to the best performing businesses.

Indeed, the ability of exchanges to generate prices efficiently has become a hallmark of their institutional function. Scholars observe that exchanges have long invested in building systems needed to disseminate prices widely and promptly across their venue, through such innovations as the telegraph and the "ticker."[70] By circulating prices to all traders within their venues, exchanges are able to "produce" a viable market for financial products.[71] The more traders a venue can attract, the greater its significance for price formation in the securities market.[72]

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[67] Goshen & Parchmovksy, *supra* note 38 (describing the essential role of information professionals in price formation and securities regulation).

[68] Gilson & Kraakman, *Information Costs, supra* note 49.

[69] Legal scholarship has developed an extensive literature on the role of mandatory disclosure for price formation, better share prices and capital allocation. A review of this literature is largely outside of the scope of this Article. See, notably, John C. Coffee, Jr., *Market Failure and the Economic Case for a Mandatory Disclosure System*, 70 VA. L. REV. 717, 720–30 (1984); Merritt B. Fox et al., *Law, Share Price Accuracy and Economic Performance: The New Evidence*, 102 MICH. L. REV. 331, 339–41 (2003). For a critical perspective on the need for a mandatory disclosure regime, HOMER KRIPKE, THE SEC AND CORPORATE DISCLOSURE: REGULATION IN SEARCH OF A PURPOSE (1979). .

[70] The Ticker displays prevailing buy and sell quotes in a particular security. The Ticker relied on the development of wire and telegraph technology to disseminate quotes widely geographically in the marketplace. More recently, exchanges have been investing heavily in developing technologies to disseminate quotes and prices as quickly as possible using such innovations as microwave technology to communicate with traders in increments measured in milliseconds. For discussion, Yesha Yadav, *Insider Trading and Market Structure*, UCLA. L. REV. 331 (forthcoming). On the ticker, see sources cited *infra* note 139.

[71] J. Harold Mulherin, Jeffrey M. Netter & James A. Overdahl, *Prices as Property: The Organization of Exchanges from a Transaction Costs Perspective*, 34 J. L. ECON. 591 (1991) (noting that

C. The Primacy of Exchange Governance

Given their role in bringing traders together and proximity to the information they generate, exchanges are ideally placed to regulate, monitor and discipline markets. Public regulators have long recognized the powerful potential of exchanges to exercise private governance in the marketplace.[73] Exchanges directly intermediate securities trades, giving them first sight of market activity. Importantly, their network effects mean that traders prize access to the exchange floor. The threat of exclusion, sanction or rebuke from an exchange should represent a strong source of discipline for traders and issuers seeking entry into the market.

Regulators rely on exchanges to set standards for admission to and behavior on their own trading venues as well as to assist in the enforcement of securities laws on the books.[74] Section 6 of the Securities and Exchange Act, for example, requires an exchange to ensure that its users can comply with the exchange's own rules as well as with applicable laws and standards governing fraud, manipulation and equitable trading.[75] Exchanges play an essential role in the implementation of the Sarbanes-Oxley Act (SOX) – the statute enacted in the wake of high-profile corporate governance scandals in the 2000s, that mandates thoroughgoing checks of a public company's internal corporate controls.[76] Exchanges verify that companies seeking to go public can demonstrate compliance with core SOX provisions in relation to board composition, director

exchanges use prices as a mechanism to produce markets); See also, Kenneth D. Garbade & William L. Silber, *Technology, Communication and the Performance of Financial Markets: 1840-1975*, 33 J. FIN. 819 (1978). See also, Macey & Kanda, *supra* note 17.

[72] In the early days of the NYSE, the NYSE attempted to contractually restrict the ability of quotes and prices generated on the NYSE to be utilized by outside trading venues. Mulherin, Netter & Overdahl, *supra* note 71, 605-611 (discussing extensive litigation in the early history of the NYSE and the definition of NYSE's property rights in the information that it generates).

[73] Jackson & Gadinis, *supra* note 1; Macey & Kanda, *supra* note 17.

[74] *See sources cited supra* note 76.

[75] *See sources cited supra* note 76.

[76] Pub.L. 107–204, 116 Stat. 745 (2002). The Sarbanes-Oxley Act (SOX) has been the source of considerable academic debate as to its real benefits for public companies, the usefulness of SOX's disclosure and reporting standards and key provisions like SOX, section 404. This Article does not seek to enter these debates. The literature on these questions is rich and expansive. For excellent review and discussion, John C. Coates & Suraj Srinivasan, *SOX after Ten Years: A Multidisciplinary Review*, Harvard Law and Economics Discussion Paper No. 758 (2014) (noting inconclusive welfare effects). For a more general survey on corporate governance and reporting rule-making, Christian Leuz & Peter Wysocki, *Economic Consequences of Financial Reporting and Disclosure Regulation: A Review and Suggestions for Future Research*, Working Paper (2008) (noting convergence in corporate governance standards, notably in relation to financial reporting).

independence and oversight committees, before they can list.[77] In this way, regulators harness the central importance of exchange services for issuer companies as well as traders – and the high costs of being potentially excluded from them – as a way to promote good behavior in the market.

In theory, exchanges possess strong incentives to exercise good governance as a basis for a robust trading process. As Professors Mahoney and Pritchard write, exchanges are motivated to craft rules strong enough to attract listed companies, trading firms and market participants to the venue.[78] Otherwise, an exchange will fail. No one will rationally wish to list or trade on a weak exchange. Scholars have diverged sharply on exactly how much authority exchanges ought to be accorded within the taxonomy of regulators in the market.[79] While Professors Mahoney and Pritchard, for example, have advocated for greater delegation of authority to exchanges, others like Professors Kahan have urged caution in view of the potential conflicts of interests discussed below.[80] Scholarly disagreement on the extent and intensity of exchange governance is understandable. However, that fact that exchanges develop rules for trading, monitoring and discipline and that they exercise broad market governance through these rules is uncontestable. Indeed, as scholars tracing their history have remarked, exchange rules have been regulating markets long before public regulators formally took up the task.[81]

This Article does not wade into this long-running discussion about how much regulatory authority exchanges ought to have relative to public authorities. Rather, this section seeks to highlight the enormous significance of the powers exchanges have always exercised, notwithstanding the concurrent, indeed predominant and growing authority of the SEC and other regulators over the years.[82] This section outlines the key levers of governance that exchanges exercise and their significance for

[77] *See e.g.*, Section 303A.00, CORPORATE GOVERNANCE STANDARDS: CORPORATE RESPONSIBILITY, NYSE LISTING HANDBOOK, http://nysemanual.nyse.com/LCMTools/PlatformViewer.asp?selectednode=chp_1_2&manual=%2Flcm%2Fsections%2Flcm-sections%2F.

[78] Mahoney, *supra* note 17, 1457-1459; Adam C. Pritchard, *Markets as Monitors: A Proposal to Replace Class Actions with Exchanges as Securities Fraud Enforcers,* 85 VA. L. REV. 925 (1999) (observing the benefits of exchange regulation for securities fraud enforcement). See also, Brummer, *supra* note 1 (analyzing exchanges as "sellers" of law).

[79] Jackson & Gadinis, *supra* note 1 (for a survey of approaches in different jurisdictions including the U.S.).

[80] Marcel Kahan, *Some Problems with Stock Exchange Based Securities Regulation,* 83 VA. L. REV. 1509 (1997).

[81] *See e.g.*, Mahoney, *supra* note 17, 1459-62; Mulherin, Netter & Overdahl, *supra* note 71, 605-620.

[82] For example, exchanges are also regulated by the Financial Industry Regulatory Authority or FINRA, a self-regulatory organization formed by broker dealers to regulate and supervise the industry. FINRA, ABOUT FINRA, http://www.finra.org/about.

capital allocation: (i) listing rules for public companies; and (ii) rules governing the conduct of traders on the exchange.

Listing Rules: exchanges stipulate an extensive set of rules and conditions for companies that wish to publically list their securities on their venue. This gatekeeping function seeks to assure investors that companies coming to the marketplace for capital can fulfill a base standard of organizational viability and competence.[83] Listing standards span the full panoply of a company's organization, its business, financial health and its on-going activities and events. The NYSE Listings Handbook, setting out the NYSE's eligibility conditions for listing, requires any public company to first satisfy specific corporate governance and financial conditions and offer extensive disclosure with respect to earnings, market capitalization, board composition and key personnel.[84] The NYSE wants its future public companies to detail how their organization handles confidential information, for instance. Such information can be useful to the exchange to help decide whether corporate personnel might have engaged in insider trading in relation to a key announcement.[85] Companies going public must also keep the exchange informed of big events and to correct misinformation in the market. Updating can assist the exchange to fulfill market surveillance. If a company faces a rumor such as possible bankruptcy, its stock might crash in price, the shock reverberating across the market. In such scenarios, an exchange might be expected to take steps to prevent a spiraling crisis on the venue.[86]

For investors giving money to a new public company in the expectation of future returns, such vetting presents an enormous boon. Rather than make investors review corporate and financial disclosures for conformity with accepted standards, exchanges can do so instead. Moreover, governance exercised by the exchange, to enforce securities and corporate governance standards can help standardize the internal composition and conduct of public companies.[87]

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[83] *See e.g.*, Mahoney, *supra* note 17, 1461-1462.

[84] NYSE, NYSE LISTING HANDBOOK, http://nysemanual.nyse.com/LCMTools/PlatformViewer.asp?selectednode=chp_1_2&manual=%2Flcm%2Fsections%2Flcm-sections%2F.

[85] Exchanges are required by statute to facilitate detection and enforcement of the prohibition against insider trading. See sources cited *supra* note 8.

[86] NYSE, NYSE LISTING HANDBOOK, http://nysemanual.nyse.com/LCMTools/PlatformViewer.asp?selectednode=chp_1_2&manual=%2Flcm%2Fsections%2Flcm-sections%2F; See also, the NASDAQ, INITIAL LISTING GUIDE https://listingcenter.nasdaq.com/assets/initialguide.pdf.

[87] Jonathan R. Macey, Maureen O'Hara & David Pompilio, *Down and Out in the Stock Market: The Law and Economics of the Delisting Process*, Working Paper, 51 J.L. ECON, 683 686-687 (2008) (analyzing the workings of the delisting process).

The significance of this scrutiny becomes readily apparent in cases when the exchange actually enforces its rules. Exchanges can "de-list" the securities of a public company such that these can no longer be traded on the venue. Sometimes, a delisting can happen by choice and prior agreement between the company and exchange (for example because of a merger).[88] But it can also occur involuntarily, such as when a company falls foul of the threshold conditions the exchange sets for listing. Analyzing the approximately 9000 companies de-listed by the NYSE, NASDAQ and American Stock Exchange (AMEX) between 1995-2005, Professors Macey, O'Hara and Pompilio concluded that almost half of all de-listings were involuntary. These occurred for a number of reasons, for example, if the company entered bankruptcy, or if it failed to maintain a minimum asset-value or market capitalization.[89] Oftentimes, a consistently low share price of under $1.00 per share prompted an exchange to take action to de-list a security.[90] Exchanges can also discipline or delist a firm if it cannot meet corporate governance standards, if trading certain securities is not in the public interest or when the exchange deems a company to be generally unsuitable for listing.[91] While more rare, delinquency notices pertaining to broader governance failures can carry strong signaling value.[92]

Empirical studies examining the delisting and exchange disciplinary process for listed companies consistently affirm its financial and expressive importance. In their study on NYSE de-listings, Macey, O'Hara and Pompilio noted that firms that underwent the procedure suffered dramatic, significant costs. Share prices fell by 50% and volatility doubled. Similarly, an examination of NASDAQ listings showed that delisted companies saw a 50% fall in share price, a tripling of the spread

[88] The steps for a merger-related delisting may be initiated by the exchange or by the company undergoing a merger, to start with using Form 25. See for example, SECTION 804.00, PROCEDURE FOR DELISTING, NYSE LISTING HANDBOOK, http://nysemanual.nyse.com/LCMTools/PlatformViewer.asp?selectednode=chp_1_2&manual=%2Flcm%2Fsections%2Flcm-sections%2F. For discussion, W. Andrew Jack and Keir D. Gumbs, *Going Dark from a Deal*, CORPORATE AND SECURITIES LAW ADVISOR INSIGHTS (Feb. 2007).

[89] *See e.g.,* Alex Longley, *NYSE Is Delisting National Bank of Greece After 91% Plunge*, BLOOMBERG, Nov. 27, 2015; Nina Mehta, *AMR Delisted From NYSE a Month After Bankruptcy Filing*, BLOOMBERG, Dec. 29, 2011 (noting the delisting of American Airlines following the filing of its Chapter 11 bankruptcy petition).

[90] Macey, O'Hara & Pompilio, *supra* note 87, 689-690.

[91] Section 802-01(D), CONTINUED LISTING: OTHER CRITERIA, NYSE LISTING HANDBOOK, http://nysemanual.nyse.com/LCMTools/PlatformViewer.asp?selectednode=chp_1_2&manual=%2Flcm%2Fsections%2Flcm-sections%2F.

[92] For example, following allegations of insider trading and the resignation of its auditor KPMG, Herbalife – the nutrition supplement company – was forced to deny suggestions that it could lose its listing on the NYSE. Steven Russolillo, *Herbalife Doesn't Expect NYSE Delisting After KPMG Resignation*, WALL ST. J. MARKETBEAT, April. 9, 2013; NYSE, NON-COMPLIANT ISSUERS, https://www.nyse.com/regulation/noncompliant-issuers

and a sharp decrease in trading volume.[93] These costs might partially reflect the impact of reduced liquidity off-exchange and the higher risks associated with a newly de-listed company. However, exchange governance matters. In a study on the impact of corporate governance deficiency notices issued by the NASDAQ to delinquent companies, Professors Frost, Racca and Stanford noted a "significantly negative" market response to the news that a company had received a notice.[94] The authors found that most companies receiving a notice eventually remedied their behavior and returned to compliance. The negative market response, however, suggested that investors paid attention to the signaling value of the exchange's enforcement efforts.[95]

Overseeing Traders: In addition to scrutinizing the behavior of listed companies, exchanges also stipulate rules-of-the-road for traders wishing to transact on the venue. Rather than allow any interested investor to enter the marketplace, exchanges restrict entry to qualified persons able to satisfy set specific eligibility criteria pertaining to such factors as financials, employee qualifications, books and records and firm capital.[96] In addition, traders must subscribe to rules of good behavior once on the trading floor. Conduct rules are designed to safeguard the market against the risks of traders committing abuses like fraud, manipulation or misusing of confidential information garnered on account of access to the exchange.[97] Under the Securities and Exchange Act, national exchanges have considerable power to discipline members that fail to follow the rules ranging from simple rebukes to outright exclusion from the venue.[98]

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[93] Venkatesh Panchapagesan & Ingrid Werner, *From Pink Slips to Pink Sheets: Market Quality Around Delisting from Nasdaq*, Working Paper (2004).

[94] Carol A. Frost, Joshua Racca & Mary Stanford, *Evidence on the Market Response to Corporate Governance Deficiencies*, Working Paper, 3-6 (2012). See also, Gary Sanger & James D. Peterson, *An Empirical Analysis of Common Stock Delistings,* 25 J. FIN. & QUANTITATIVE ANALYSIS 261 (1990) (noting price declines after delisting announcements).

[95] In one international study examining the impact of exchange regulation on firm performance, scholars studied listings on the London Stock Exchange (LSE), which imposes strict governance conditions, and what happens when these listings move to the expressly more lightly regulated Alternative Investment Market (AIM). Scholars noted that companies that moved from the LSE to the AIM see a 5% fall in share price on the announcement. Smaller companies, however, reverse these losses, suggesting that the lighter regulation may be beneficial for some companies. For more discussion, Tim Jenkinson & Tarun Ramadorai, *Does One Size Fit All? The Consequences of Switching Markets with Different Regulatory Standards*, ECGI - Finance Working Paper No. 212/2008 (2008).

[96] *See e.g.*, NYSE, EQUITIES RULES, http://wallstreet.cch.com/MKTtools/PlatformViewer.asp?SelectedNode=chp_1_5&manual=/MKT/rules/mkt-rules/. It is worth noting that exchanges can sometimes offer "direct market access" to some investors. Rather than become members of an exchange, investors can use a member's ID to access an exchange floor, subject to supervision by an exchange member. NYSE, EQUITIES, SPECS AND CONNECTIVITY OPTIONS, https://www.nyse.com/connectivity/specs.

[97] *See e.g.*, NYSE ARCA, EQUITIES RULES: CONDUCT RULES, http://nysearcarules.nyse.com/PCXtools/PlatformViewer.asp?SelectedNode=chp_1_1&manual=/PCX/pcxe/pcxe-rules/.

[98] §6(b)(7), Securities and Exchange Act 1934.

In many ways, this regulatory approach makes considerable sense. Exchanges harbor close informational and transactional ties to their traders, with presumably an enormous reserve of experience and expertise in understanding how traders behave.[99] Moreover, in a high-speed, hi-tech trading environment, exchanges occupy a front-row seat on the latest happenings taking place on the trading floor.[100] Perhaps most importantly, exchange discipline should have real bite. Punishment by an exchange, encompassing fines, public rebukes, and ultimately exclusion from the trading floor can carry stigma as well as the real economic cost of traders losing the ability to easily buy and sell securities.[101]

Indeed, the power of exchange governance is also revealed by the cases where exchanges appear to have fallen short in discharging their responsibilities. For instance, the Chicago Mercantile Exchange (CME) – a leading marketplace for trading derivatives – was widely criticized for its failure to supervise the infamous brokerage firm, MF Global. In that case, an apparently insufficient examination by the CME of MF Global's systems for managing client money failed to catch intermingling between MF Global's own funds and those of its clients. After losing a $6.3 billion on a bet in the market, MF Global declared bankruptcy, jeopardizing around $1.6 billion of co-mingled client money.[102]

In 2015, the CME was again under scrutiny for seeming laxity in disciplining a trader that appeared to have been engaged in deliberately spoofing markets – entering a series of fake orders with the intent of altering securities prices. According to a complaint by the CFTC and the Justice Department, this single trader impacted the market powerfully enough to precipitate an almost 1000 point plunge-and-rebound in the Dow Jones Index in May 2010 – an event that came to be known as the *Flash Crash*. The trader was known to the CME because of prior bad dealings.

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[99] For discussion, Yesha Yadav, *the Failure of Liability in Modern Markets*, 103 VA. L. REV. (2016) (forthcoming). On rapid price synchronicity in automated markets, see, Austin Gerig, *High-Frequency Trading Synchronizes Prices in Financial Markets* (Nov. 2015). On market automation more broadly and the role of high-speed algorithms in everyday trading, Jonathan Brogaard, Terence Hendershott & Ryan Riordan, *High Frequency Trading and Price Discovery* (European Central Bank Working Paper Series No. 1602, (2013); Alain Chaboud, Benjamin Chiquoine, Erik Hjalmarsson & Clara Vega, *Rise of the Machines: Algorithmic Trading in the Foreign Exchange Market* (July 5, 2013). On the volatility and riskiness of high-speed, automated markets, Robert Jarrow & Phillip Protter, *A Dysfunctional Role of High Frequency Trading in Electronic Markets* 3-6 (Johnson Sch. Research Paper Series, No. 08-2011, 2011).

[100] SEC Regulation Systems, Compliance and Integrity (Reg. SCI), Release No. 34 7363917 CFR Parts 240 (Feb. 2015).

[101] *See e.g.*, Mahoney, *supra* note 17.

[102] Gregory Meyer and Hal Weitzman, *MF Global's Fall Puts Spotlight on CME Group*, FIN. TIMES, Nov. 2 2011. Matthew Leising & Donal Griffin, *Corzine's Lack of MF Global Controls Exposed With Missing Customer Money*, BLOOMBERG (Nov. 2, 2011), http://www.bloomberg.com/news/2011-11-02/corzine-s-lack-of-mfglobal-controls-exposed-with-missing-customer-money.html. For analysis, Rena S. Miller, *The MF Global Bankruptcy, Missing Customer Funds, and Proposals for Reform*, Congressional Research Service Report 7-5700 (Aug. 1. 2013).

Although the exchange had warned him repeatedly for his conduct, it had failed to take further action to exclude him from the venue. In that case, trouble on the CME rapidly cascaded across various other exchanges and venues resulting in a widespread crisis.[103]

Cases like the collapse of MF Global and the near miss during the Flash Crash illustrate the significance as well as the costs of exchange governance. Clearly, exchanges face enormous financial and reputational pressures to provide good governance, a fact that has not gone unremarked by the exchanges themselves. In its annual disclosure the operators of the NYSE note, for instance, the need for its organization to devote "significant resources" to governance and the apparatus of surveillance, investigation and discipline.

To be sure, governance by exchanges is far from uncontroversial. Exchanges like the NYSE and NASDAQ are themselves part of for-profit corporate groups, whose own shares are listed and traded.[104] Numerous scholars have remarked on the deeply distorted incentives that for-profit exchanges harbor to be good monitors and disciplinarians.[105] Traders and listed companies – even if badly behaved – provide the profits that deliver dividends to an exchange's own shareholders. Limiting the business or imposing high costs that drive traders off-exchange can represent a bad outcome for an exchange's bottom line. As Professor Kahan observes, exchanges may also be reluctant to acknowledge that their venues can be home to misbehaving traders.[106] These concerns are not merely a matter of scholarly interest. In a prominent rebuke to the Chicago Board of Options Exchange (CBOE) – a derivatives exchange – the SEC chastised and fined the CBOE $6m for failing to discipline a problem trader and for privileging its own business interests over and above the public good. In this case, when the problem trader came under SEC investigation, the CBOE went as far as to help the trader with drafting its submission to the SEC and additionally failed to give information on the trader to the

[103] For detail, United States v. Sarao, Criminal Complaint U.S. District Court Northern District of Illinois, Case Number 15 CR 75., Feb, 11, 2015; For comment, John Cassidy, *the Day Trader and the Flash Crash: Unanswered Questions*, NEW YORKER, Apr. 23, 2015. For a report disputing this account by the Justice Department and the CFTC, see, Eric M. Aldrich, Joseph Grundfest & Gregory Laughlin, *The Flash Crash: A New Deconstruction*, Working Paper (2016), 4-7 - http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2721922; For another explanation, see Andrei Kirilenko et al., *The Flash Crash: The Impact of High Frequency Trading on an Electronic Market*, Working Paper (2014) (detailing an alternative story for the Flash Crash, focusing on a large sell order from a Kansas mutual fund and a subsequent disappearance of liquidity provided by high frequency traders. http://www.cftc.gov/ucm/groups/public/@economicanalysis/documents/file/oce_flashcrash0314.pdf; Craig Pirrong, *Did Spoofing Cause the Flash Crash? Not So Fast!* STREETWISE PROFESSOR (Apr, 22, 2013), http://streetwiseprofessor.com/?p=9331.

[104] *See e.g.*, INTERCONTINENTAL EXCHANGE, ANNUAL REPORT, 4-9 (2014).

[105] Jackon & Gadinis, *supra* note 1; Karmel, *supra* note 1; Pirrong, *supra* note 44.

[106] Kahan, *supra* note 80, 1517-1559

regulator.[107] Indeed, the NYSE's own corporate disclosures openly acknowledge the contradiction at the heart of exchange governance between the exchange's costly role as regulator – and its private need to make a profit for its own shareholders.[108]

Still, the rationale underpinning this expenditure ultimately rests on ensuring a more efficient environment for capital allocation for markets. In the absence of exchanges internalizing the costs of policing public companies and those who trade their securities, investors must bear the burden of protecting themselves. Facing systematic, duplicative costs, theory suggests, investors will be reluctant to devote the full weight of their capital towards fueling the growth of productive enterprises.[109]

II. FROM CONSOLIDATION TO FRAGMENTATION

Theory states that exchanges rely on network benefits to attract increasing trading volume to their venue.[110] This basic logic underlying the exchange – its economic function of matching traders and disseminating information – suggests that markets are best served when they consolidate all their trading into one or perhaps a small number of venues. Consolidation can heighten the pull of network externalities. It can also facilitate the creation of price efficiency.

But consolidation also has its drawbacks. In particular, it encourages a monopoly – or at best, an oligopoly – in the provision of trading services. As a result, exchanges are well placed to extract private rents from users, for example, by charging investors overly high fees, using a weak infrastructure or delivering a poor service to investors. These risks may be especially live if exchanges are constituted as for-profit institutions, seeking to maximize their private returns from their captive base of investors and listed companies.[111]

U.S. regulatory policy has sought to navigate the tension between the benefits of consolidation and its risks by using a two-pronged approach: (i) to force exchanges to compete not just with one another but also with alternative trading venues – smaller, less regulated platforms that can also match buyers and sellers with one another; and (ii) to require that

[107] Securities and Exchange Commission, SEC Charges CBOE for Regulatory Failures, Press Release, Jun. 11, 2013, https://www.sec.gov/News/PressRelease/Detail/PressRelease/1365171575348.

[108] INTERCONTINENTAL EXCHANGE, ANNUAL REPORT, 27-28 (2014).

[109] Damodaran, *supra* note 41.

[110] Madhavan, *supra* note 22.

[111] Madhavan, *supra* note 22. Karmel, *supra* note 1, 164-166.

any investor trading anywhere in this system of venues can do so at the best price. By fostering competition to generate the best price on the system, regulation seeks to create a national market of individual exchanges and trading venues each fighting to attract business to their floor.[112] They must compete. But they are also interconnected through strong informational and transactional linkages that enable investors to easily pick and choose where to trade.[113]

This Part examines the evolution of market structure from consolidation to its current state of heavy fragmentation.[114] It highlights the regulatory objectives driving this transformation – to encourage competition and to lower transaction costs – and the real-world realization of these objectives in a proliferation of trading venues. This Part analyzes how conventional theories of exchange design, discussed in Part I, apply to this fragmented market. It sets the basis for questioning how effectively a fragmented market structure can provide market governance.

A. The National Market

Traditionally, securities traded on the exchanges on which they first listed for subscription from the public. If a Public Company listed its shares on the NYSE, any investors wishing to buy and sell them in post-IPO trading would also have to go to the NYSE to conclude their deals.[115] This arrangement provided a number of benefits to the listing exchange. For a start, an exchange could count on a steady volume of trades coming to its floor, bringing fees, information and generating network gains. In addition, it also ensured the committed participation of market makers on the venue, to maintain liquidity and to prevent sudden spikes and crashes in demand and supply.[116] For scholars that consider exchanges as working

[112] *See discussion infra* Part III(A).

[113] O'Hara & Ye, *supra* note 8.

[114] This Article uses the term "national market" somewhat loosely and non-technically to reference the collection of exchanges and alternative trading platforms that transact in nationally listed securities. It is acknowledged that Regulation NMS and Regulation ATS use a more technical definition of the National Market System to emphasize those venues that must report their quotes into the ticker.

[115] Stephen Diamond & Jennifer Kuan, *Governance Heterogeneity and Performance at US Stock Exchanges: Evidence from Regulation NMS*, Working Paper (Mar. 2012).

[116] Diamond & Kuan, *supra* note 115. On the role of market makers, Hendrik Bessembinder, Jia Hao & Michael Lemmon, *Why Designate Market Makers? Affirmative Obligations and Market Quality*, Working Paper (2011); On different models of market making and their implications, Katrina Ellis, Roni Michaely & Maureen O'Hara, *The Making of a Dealer Market: From Entry to Equilibrium in the Trading of Nasdaq Stocks*, Working Paper, Working Paper, available at, http://forum.johnson.cornell.edu/faculty/michaely/Michaely.pdf . On market making in the swaps market

most effectively when organized as monopolies, this state of affairs promoted a market where trading in securities concentrated naturally in one place.[117]

But consolidation can also be problematic. Knowing they will see a reliable stream of listings and secondary trading, exchanges and dealers can extract rents from their position. Exchanges can charge high fees for each transaction. Dealers, too, can maintain higher spreads than justified. On several occasions, the NYSE and the NASDAQ acted in ways that either exhibited or tolerated harmful cartelized conduct. In a famous study from the 1990s, Professors Christie and Schultz found that NASDAQ dealers were rounding-up quoted spreads to the next even-eighths.[118] This pointed to an institutionalized practice of systematic collusion between dealers and padding of spreads. Elsewhere, the NYSE was sanctioned for failing to catch its market makers engaged in an abusive scheme of front-running client orders. Market makers, knowing how their clients were going to trade, used that knowledge to get to the trade first, making the deal more expensive for the client. 15 market makers took home around $19million in unauthorized winnings from this practice. The NYSE faced SEC sanction for failing to catch this wrongdoing between 1999-2004.[119]

From an investor-centric perspective, consolidation can also undermine investor choice. Investors can have varied preferences regarding how they wish to trade, what they wish to reveal to the market, or how immediately they wish to transact. For example, an institutional investor, careful to hide a large block order, might want to transact away from full-public view, or in smaller, bit-pieces of securities across many exchanges to avoid being caught. A mandate to transact on just a handful of exchanges can force a homogenizing model on a diverse group that fails to fulfill the many strategic goals that investors may have.[120]

Regulation has sought to find a fix to the problem of high investor costs through the creation of a National Market System.[121] Central to its

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and the potential for distorted incentives, see, Robert B. Thompson, *Market Makers and Vampire Squid: Regulating Securities Markets after the Financial Meltdown*, 89 Wash. U. L. Rev. 323 (2011).

[117] Diamond & Kuan, *supra* note 115. Demsetz, *supra* note 18.

[118] William G. Christie and Paul H. Schultz, *Why Do NASDAQ Market-makers Avoid Odd-Eighth Quotes*, 49 J. FIN. 1813 (1994); Prajit Dutta & Ananth Madhavan, *Competition and Collusion in Dealer Markets*, 52 J. FIN. 245 (1997) (arguing that dealers have incentives to be collusive).

[119] THE ECONOMIST, *Specialists Stumble*, April 14, 2005, http://www.economist.com/node/3871250; Press Release, SEC, SEC Charges The New York Stock Exchange with Failing to Police Specialists (Apr. 12, 2005).

[120] Diamond & Kuan, *supra* note 115.

[121] Securities Acts Amendments of 1975, Pub. L. No. 94-29 § 7, 89 Stat. 97, 111–17; Regulation NMS—National Market System, Exchange Act Release No. 34-51808, 70 Fed. Reg. 37,496, 37,532 n.300 (June 29, 2005); *see also* U.S. SEC. & EXCH. COMM'N, MARKET 2000: AN EXAMINATION OF CURRENT EQUITY MARKET DEVELOPMENTS 17, 1-3 (1994).

design is the goal of ensuring that investors anywhere within the System can get the best price for their trade. They do not have to trade on the exchange on which the securities are listed – but rather anywhere within the System that offers the best price.[122] While much has been written about the National Market System and its shortcomings, its broad policy objective is simple and laudable – to reduce unnecessary transaction costs and to encourage efficient investment within the securities market.[123]

The centerpiece of the National Market System – in effect, its core implementing measure – is the Order Protection Rule. This Rule prohibits exchanges from executing an order at a price that is worse than the best available price within the System. It allows some exceptions – for example, if a client gives a dealer permission to avoid the Rule. But it prevents exchanges from requiring that all orders "trade through" the exchange on which the security is listed.[124] In effect, the Rule breaks the thick link between a security and its home exchange and requires market makers and brokers to look across exchanges to find the best price. To ensure that securities can, in fact, be traded on the most cost-effective venue, exchanges are required to continuously supply quotes into a national ticker - the Consolidated Tape. The Tape or Ticker collects quotes from exchanges, aggregates the data and disseminates the best prices available at a given time on the national network of exchanges.[125]

B. Exchange Competition

Regulatory policy has also sought to solve the problem of investor choice by encouraging the creation of multiple exchanges and alternative trading venues. There would be little point to a National Market System –

[122] Regulation National Market System Rule 611, Order Protection Rule, 17 CFR 242.611 (2005). Regulation NMS—National Market System, Exchange Act Release No. 34-51808, 70 Fed. Reg. 37,496, 37,532 n.300 (June 29, 2005). For an early elaboration of the core goals of the NMS in 1975, The Securities Exchange Act, 15 U.S.C. §78k-1(a)(1)(c). For an account of the beginning of the NMS and its structural goals, Laura Beny, *U. S. Secondary Stock Markets: A Survey of Current Regulatory and Structural Issues and a Reform Proposal to Enhance Competition*, COLUM. BUS. L. REV. 399, 412-420 (2002).

[123] Jonathan R. Macey & David D. Haddock, *Shirking at the SEC: The Failure of the National Market System*, 1985 U. ILL. L. REV. 315, 337–44 (1985); and Norman S. Poser, *Restructuring the Stock Markets: A Critical Look at the SEC's National Market System*, 56 N.Y.U. L. REV. 883, 957–58 (1981); U.S. SEC. & EXCH. COMM'N, MARKET 2000: AN EXAMINATION OF CURRENT EQUITY MARKET DEVELOPMENTS 17, 1-3 (1994).

[124] Xiang Cai, *Treading through Trade-Through: A Law and Economics Analysis of SEC Proposed Regulation NMS*, Working Paper, 3-7 (2005).

[125] Regulation National Market System Rule 600, 17 CFR 242.600; Regulation National Market System Rule 611, 17 CFR 242.611; Consolidated Tape Association, Overview, available at, https://www.ctaplan.com/CTA.

where shares should trade at the cheapest price on any venue – if it comprised just a few trading platforms. The national market and the regulatory goal underlying the Order Protection Rule presuppose the availability of multiple exchanges and trading venues. In theory, without a few competing venues, there would be little incentive for dominant exchanges to reduce their prices or to create conditions that might offer varied services to investors.[126]

SEC rulemaking has deliberately favored competition as a policy preference in market design. Regulation Alternative Trading Systems (Reg ATS) allows venues to trade nationally listed securities without requiring to be formally authorized as a Section 6 exchange under the Securities and Exchange Act.[127] Under Reg ATS, broker-dealers can set up venues to match buyers and sellers – essentially performing what would be regarded as an exchange-like function – without requiring to be authorized as an exchange.[128] This means that broker-dealers can establish private platforms to transact in securities or build their own communication networks to connect investors without having to go through an exchange first.[129] Reg ATS permits broker-dealers to enjoy considerable latitude in their ability to establish non-exchange trading mechanisms, expanding investor choice and hopefully reducing transaction costs.[130]

Importantly, ATS have operated within a much lighter regulatory regime than traditional exchanges. Unlike Section 6 exchanges, subject to extensive obligations to ensure fair (but exacting) entry onto their venues, continuous price disclosure and the duty to ensure governance, ATS face a far lower regulatory burden.

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[126] Regulation NMS—National Market System, Exchange Act Release No. 34-51808, 70 Fed. Reg. 37,496, 37,532 n.300 (June 29, 2005).

[127] Regulation ATS—Alternative Trading Systems, 17 C.F.R. § 242.300(a) (2015). Reg ATS opens the door to broker-dealers that set up ATS to seek registration as a Section 6 exchange.

[128] Rule 300(a) of Reg ATS states that an ATS is: (a)…any organization, association, person, group of persons, or system: (1) That constitutes, maintains, or provides a market place or facilities for bringing together purchasers and sellers of securities or for otherwise performing with respect to securities the functions commonly performed by a stock exchange within the meaning of § 240.3b-16 of this chapter; and (2) That does not: (i) Set rules governing the conduct of subscribers other than the conduct of such subscribers' trading on such organization, association, person, group of persons, or system; or (ii) Discipline subscribers other than by exclusion from trading.")

[129] O'Hara & Ye, *supra* note 8 (noting the variety of off-exchange venues, including electronic communication networks). On larger questions and trends towards disintermediation, as facilitated by technological innovation see, Chris Brummer, *Disruptive Technology and Securities Regulation*, 83 FORDHAM L. REV. (forthcoming 2016).

[130] Regulation ATS—Alternative Trading Systems, 17 C.F.R. § 242.300(a) (2015) ("The final rules seek to establish a regulatory framework that makes sense both for current and future securities markets. This regulatory framework should encourage market innovation while ensuring basic investor protections…In general, this approach gives securities markets a choice to register as exchanges, or to register as broker-dealers and comply with Regulation ATS.")

Key Regulatory Characteristics: First, Reg ATS requires trading platforms to register as an Alternative Trading System (ATS) with the SEC. As part of this process, ATS must provide disclosure regarding the core terms on which the ATS intends to operate. Whereas exchanges promise standardization to investors and one-size-for-all terms of trading, ATS can vary widely in type and offer investors a diverse range of services. For example, the IEX trading platform, a centerpiece of Michael Lewis' book *Flash Boys*, promises to subject all orders to a 350-microsecond delay in processing. As outlined by the IEX, its platform is designed to reduce the systemic advantages enjoyed by high-frequency traders on national exchanges.[131] The IEX seeks to deal with investor concerns about the prowess of high-speed traders that anticipate informed investors and race ahead to capture the best trades in the market.[132]

These terms of operation can be critical to setting regulatory and investor expectations. In January 2016, the SEC and the Attorney General for New York fined Barclays for false advertising in relation to the ATS that it operated. In the case of Barclays, regulators found that it had misrepresented the terms on which it ran its ATS. In that case, investors believed that they would not trade on an ATS that also included aggressive high frequency traders. Barclays, however, did allow predatory, anticipatory HFTs to enter and transact with other investors.[133]

Second, ATS are generally subject to much lower transparency and other regulatory requirements than conventional exchanges. The National Market System demands that exchanges supply a continuous flow of buy-and-sell quotes into the Ticker. This helps ensure that the System can assure investors that they can get the best price in the Market.

ATS operate in a quite different regulatory environment. An ATS that represents less than 5% of trading volume in a publically listed stock

[131] The IEX is seeking to become a full Section 6 Exchange, Securities and Exchange Commission, Investors' Exchange, LLC; Notice of Filing of Application, as Amended, for Registration as a National Securities Exchange under Section 6 of the Securities Exchange Act of 1934, Release No. 34-75925 (Sept. 15, 2015).

[132] Order anticipation strategies might work as follows. If a large order from an Informed Hedge Fund for Public Company shares enters the NYSE, a HFT trader might react to this information by rapidly purchasing shares on the NYSE and other available shares on the NYSE, BATS or other exchanges. After purchasing these shares, the HFT can then re-sell them to the Informed Hedge Fund at a slightly higher price. In this way, the Hedge Fund pays a higher price in the presence of the HFT anticipator. For a discussion of HFT and common trading strategies including anticipation, Yesha Yadav, *Algorithmic Trading*, *supra* note 66, 116-119. On the economic effects of order anticipation by HFT traders, Nicholas H. Hirschey, *Do High Frequency Traders Anticipate Buying and Selling Pressure*, Working Paper (2013) (noting that HFT's consistently anticipate informed orders. On the IEX exchange, IEX Trading Alert 023 (Nov. 3 2013), http://www.iextrading.com/trading/alerts/2014/023/; IEX, About IEX, http://www.iextrading.com/about/.

[133] Keri Geiger & Sam Mamudi, *Barclays, Credit Suisse Agree to Dark Pools Settlements*, BLOOMBERG, Jan. 31, 2016; William Alden, *New York Attorney General Adds to Lawsuit Over Barclays Dark Pool*, N.Y. TIMES, Jan. 21, 2015.

in the national market (in this Article, referred to as a "Common" ATS) does not have to send its quotes into the Ticker. This 5% threshold is not especially exacting. While an ATS might perhaps end up executing over 5% in any single security, no ATS has captured over 5% of all U.S. equity volume on a consolidated basis. The largest ATS – Credit Suisse's Crossfinder – saw around 1.88% of all equity trading volume in 2013.[134]

Post-trade reporting requirements for such ATS are also subject to a substantial time delay. Common ATS need only send post-trade information to the self-regulatory organization, FINRA, within seven business days at the end of each week.[135] FINRA then makes this data available to the public with a minimum delay of two weeks for certain NMS securities and four weeks in the case of others.[136] In all, ATS represent something of a paradigm shift from traditional exchanges: pre-trade, these ATS do not have to display their quotes. And post-trade, information might take a week or so to reach a regulator and even longer to make it into the public domain. Post-trade reporting should encourage any ATS to match trades at the best NMS price. However, the lack of transparency before and immediately after trading gives investors as well as ATS enormous latitude in how they transact in publically listed NMS securities. Because of this black-box approach to transparency, ATS are colloquially termed "dark pools," venues on which price transparency is limited or, at best, heavily delayed.[137]

Thirdly, ATS carry far lighter responsibilities for market and member governance. Under Regulation ATS, ATS trading venues do not need to exercise the level of intensity expected of Section 6 exchanges. For one, ATS are heavily circumscribed in their ability to set rules for governing their venues. For example, Common ATS are not subject to provide fair access to investors. This can allow the ATS to be choosy about who can use their venue. Importantly, these ATS can only discipline their subscribers by excluding them from the venue, rather than deploying the sliding scale of governance levers common to exchanges. Finally, ATS governance rules can only apply narrowly to their subscribers' conduct on the venue itself – and not more broadly. This means that ATS cannot

[134] *See e.g.*, Ivy Schmerken, *Dark Pools Grab Market Share*, Rosenblatt Report, Feb. 27 2013, http://rblt.com/news_details.aspx?id=228.

[135] FINRA, ALTERNATIVE TRADING SYSTEMS (ATS) TRANSPARENCY, http://www.finra.org/industry/alternative-trading-system-ats; FINRA RULE 4552, http://finra.complinet.com/en/display/display.html?rbid=2403&record_id=15496&element_id=11385. (FINRA Rule 4552 stipulates post-trade transparency. Received data on equity is then displayed publically). FINRA requires reporting by aggregate volume of trading certain securities.

[136] FINRA RULE 4552, http://finra.complinet.com/en/display/display.html?rbid=2403&record_id=15496&element_id=11385.

[137] *See discussion infra* Part II(B).

deeply regulate core institutional features about their subscribers – like how much capital they should keep, their employee qualifications, or books and record keeping. With a more limited remit to control the institutional and behavioral conduct of their subscribers, ATS should face lower resource costs for market discipline.

Informational and Transactional Links: The interplay of the Order Protection Rule and Regulation ATS transforms the informational and transactional architecture of the marketplace. The Order Protection Rule requires that investors can demand that shares trade at the best price anywhere in the National Market System. Regulation ATS can help expand the range of trading venues available to investors, giving them enormous choice about where they wish to trade and what factors are important to them when they enter the marketplace (e.g. do they wish to trade with HFTs?). Unsurprisingly, the implementation of the Order Protection Rule and the expansion of the market under Regulation ATS have resulted in the creation of a deeply interconnected securities market.

For a start, information must flow freely and rapidly across the market, not just to exchanges but also to ATS. In order for prices to be competitive, exchanges must continuously update their quotes and to transmit them across the market. The Consolidated Tape (or Ticker) organizes this process of collecting, updating and distributing information.[138] Importantly, even if ATS are not directly supplying fresh quotes to the Ticker, they still need to receive information to benchmark prices on their venue. If they charge significantly higher prices than what is available on public exchanges, then investors will have little motivation to enter an ATS. Information constitutes a critical resource that is necessary to assure regulatory compliance with the Order Protection Rule. In turn, it connects venues in the market to one another.

More importantly, markets are also connected to each other through hard transactional linkages. Because of the Order Protection Rule, brokers need to show that they have secured the best price for their clients. With many options available, brokers must build responsive links to exchanges and ATS in order to route customer orders to the exchange or ATS that promises to give their clients the best price or desired services.

Moreover, these transactional linkages are thickened by the presence of market makers that can supply their liquidity to a plethora of exchanges and venues across the market. Responding to new information as well as to investor preferences, market makers can buy and sell on multiple exchanges and ATS. It is well established in finance theory that

[138] Consolidated Tape Association, Overview, available at, https://www.ctaplan.com/CTA.

liquidity suppliers connect markets by trading across venues.[139] This can broaden their opportunities to make money. It can also help control their risks. When market makers spot a problem on one market, they can retreat from that as well as other markets, protecting themselves in the process. The ability of modern market makers, like high-speed traders, to move between venues, strengthens the transactional linkages underlying the market. Emerging evidence is instructive. Finance scholars observe a market that is deeply interconnected. Professor Gerig notes that, despite the many venues in operation, today's markets are highly efficient at reflecting information, with prices synchronizing rapidly throughout the marketplace. While positive as a general indicator of efficiency, this interconnection can also be problematic. Gerig observes that errors too can sweep quickly across venues, transmitted by information and traders to move in milliseconds between platforms.

C. Impact of Fragmentation

Regulation ATS and the Order Protection Rule has transformed the structure of securities markets. Most obviously, the number of exchanges and exchange-like venues has mushroomed rapidly. By some estimates, the market comprises as many as 11 public exchanges and around 45 dark pools. Alongside these platforms, commentators note that broker-dealers also routinely "internalize" orders, meaning that they match their own buyers and sellers with one another in-house. So, if a Broker knows that Client A wishes to buy 100 shares of Public Company and Client B wishes to sell 100 of these shares, it can easily match the pair together at the NMS price, or perhaps better. This saves the Broker the trouble of scouring the market and it can keep its business in-house. Some reports suggest that there may be around 200 such "internalizers" operating in the marketplace alongside exchanges and dark pools.[140]

This proliferation of trading venues has dramatically impacted the volume of business that flows to public exchanges. Scholars report that the NYSE's virtual monopoly in secondary trading in stock listed on its venue has dwindled rapidly since the implementation of the Order Protection Rule in 2005, falling from 80% to 34% in just three years.[141] In their study

[139] *See e.g.*, Markus K. Brunnermeier & Lasse H. Pedersen, *Market Liquidity & Funding Liquidity*, 22 REV. FIN. STUD. 2201, 2202-4(2009).

[140] Mamudi, *supra* note 8; John McCrank, *Dark Markets May Be More Harmful than High Frequency Trading*, REUTERS, April 7, 2014; On the rising number of dark pools, John McCrank, *Luminex 'Dark Pool' Enlists 73 Members Ahead of Trading Launch*, REUTERS. October 4, 2015.

[141] Diamond & Kuan, *supra* note 115,

on equity fragmentation, Professors O'Hara and Ye Report observe that more than 50% of all equity volume trades away from its home exchange, with off-exchange venues (e.g. dark pools) handling 30% of all equity volume.[142] Some estimates suggest that this figure is higher, positing that dark trading now accounts for almost 40% of equity trading volume.[143] To appreciate the structural depth of this fragmentation, it is worth briefly examining two inquiries: (i) what types of ATS operate in the market?; and (ii) why do investors wish to trade in dark venues over lit ones?.

Types of ATS: Perhaps the most distinguishing feature of the ATS in operation is their sheer variety. Broadly, ATS can be divided into four general categories.[144]

First, some ATS internalize orders, as described above. Firms that are organized as large broker-dealers, with clients on both sides of the trade, can offer this service.[145]

Secondly, some ATS represent communication networks that connect buyers and sellers with each other. For example, a Hedge Fund might post its interest to buy 100 shares of Public Company on an electronic communication network. A Mutual Fund can respond to that interest by offering to sell these shares to the Hedge Fund. These communication networks facilitate customer-to-customer trading, eliminating the middleman and providing investors with a lower cost option than on an exchange. If investors are large institutions, and enough of them participate in the network, using communication networks can reduce the fees they usually pay for trading.[146]

Thirdly, ATS can facilitate large block trading of shares. Specialized dark pools can help investors to dispose of sizable chunks of shares whose trading may reveal too much information about strategy – and cause too big a splash in the public marketplace.[147]

Fourthly, dark pools can also provide a venue to match shares, just as an exchange might. Rather than sending orders to an exchange, where an investor must pay exchange fees, brokers can instead send these into a dark pool that offers special services that a customer likes or lower charges. This reflects the kind of model adopted by the Barclay's dark

[142] O'Hara & Ye, *supra* note 8, 2-5.

[143] Arash Massoudi & Michael Mackenzie, *Stock Exchanges Seek to Stem the Tide of Dark Trading,* FIN. TIMES, April 25, 2013.

[144] For discussion, Haoxiang Zhu, *Do Dark Pools Harm Price Discovery, Trading*, 27 REV. FIN. STUD. 747, 749-754 (2014).

[145] McCrank, *supra* note 23.

[146] Michael J. Barclay, Terrence Hendershott & D. Timothy McCormick, *Electronic Communication Networks & Market Quality*, Working Paper, 2-5 (2001).

[147] Markus Brunnermeier & Lars Pedersen, *Predatory Trading*, 60 J. FIN. 1825 (2005) (noting that investors that show how they intend to trade are vulnerable to being picked off by predatory traders).

pool, whose terms of service (ostensibly) gave investors an opportunity to avoid predatory high frequency traders. The IEX, similarly, markets itself as an option where a mandatory time delay equalizes the playing field between HFT and other investors. Indeed, scholars note that orders processed by dark pools represent, on average, a fairly ordinary and small number of shares (in one study, 256 shares per trade) – rather than large blocks that might trouble public exchanges.[148] Put simply, investors are choosing to trade in a dark pool, rather than on a public exchange.

Why Trade Off-Exchange? At first glance, theory would predict that investors should choose to trade on a public exchange and not elsewhere. The benefits generated by networks of users, in terms of trading opportunities as well as transaction costs, would suggest that investors should gravitate towards public exchanges.

This, however, is clearly not the case in modern markets, or even historically. Scholars have long puzzled over this conundrum – why, despite positive network externalities – do investors still choose to trade outside of the most deeply networked venues? One possible explanataion, as Professor Madhavan posits, is that investors are varied and come to the market with different needs and tolerance for transaction costs.[149]

First, ATS like dark pools offer enormous anonymity to those that wish to trade on them. Regulation ATS does not require Common ATS to publish their quotes, nor is post-trade information made immediately and readily available to the market. Unlike an exchange, trading within dark pools occurs within the confines of the venue itself. Subscribers to the dark pool might sometimes garner some information alongside the dark pool operator. Beyond this basic disclosure, however, regulation has expressly created pockets within the market for listed securities to transact with very little transparency.[150]

This anonymity might suit traders that want to safeguard the value of their information. The longer their information remains hidden, the better their chances to make money. This rationale appears powerful in driving volumes towards those dark pools that limit the activity of high frequency traders – commonly viewed as adept in anticipating and trading ahead of informed investors.[151]

Anonymity can also explain why traders interested in disposing or acquiring large blocks of shares might move towards the many dark pools available to them. Multiple venues can facilitate block trading, for example

[148] Frank Hatheway, Amy Kwan & Hui Zheng, *An Empirical Analysis of Market Segmentation on U.S. Equities Markets*, Working Paper, 3-5 (Nov. 2014).

[149] Madhavan, *supra* note 22.

[150] *See e.g.*, Hatheway, Kwan & Zheng, *supra* note 147.

[151] Yadav, *Algorithmic Trading*, *supra* note 66, 151-158.

if traders can strategically transact small amounts across several platforms. Even on just one platform, a skilled broker can execute the order in a piecemeal way over time to avoid detection. In this way, ATS can offer a meaningful service by helping investors to transact in blocks without giving away their intention and reducing the impact on the market.[152]

Anonymity can, of course, also attract bad apples. Some investors may be incentivized to transact on dark pools because they will avoid being discovered in their intent to manipulate or deceive the marketplace. Critically, ATS have a far lower burden in terms of exercising market governance. Under Regulation ATS, operators are limited to mandating rules to cover conduct that takes place on their specific venue. Further, their disciplinary power lies only in exclusion.[153] Within these parameters, dark pool operators may exercise discipline when they absolutely have to do so. If the only option available to a dark pool operator is exclusion – losing investors that generate volume, business and fees – the motivation to monitor bad behavior may be limited.

Secondly, investors may shift their business to dark pools in order to benefit from lower transaction costs and fees. When trading on an exchange, investors can enjoy network benefits but they also face costs, notably in the form of fees (e.g. NYSE) or spreads (e.g. the NASDAQ). ATS like dark pools and communication networks are well placed to compete aggressively with exchanges on transaction costs. Importantly, their regulatory obligations are significantly fewer than those faced by regular exchanges. As part of these limited obligations, dark pools do not have to conform to the usual pricing regulations that normally constrain exchanges. For example, exchanges cannot quote prices in increments that are less than a penny.[154] Because sub-penny pricing is not permitted on public exchanges, securities prices have be rounded to the nearest penny. Dark pools can compete with exchanges by quoting prices in increments that are less than a penny. Instead of rounding to the nearest penny, dark pools can quote more nuanced prices that can be within a penny and thus lower than those set by exchanges. If an investor wishes to trade a large amount of shares or to trade frequently, entering a dark pool can provide a real and worthwhile saving. Just this one species of difference between dark pools and regular exchanges holds considerable economic significance. Professors Masulis, Kwan and McInish observe that the

[152] Hatheway, Kwan & Zheng, *supra* note 147, 4-6.

[153] *See discusiion cited supra* Part II(B).

[154] Regulation National Market System Rule 612, 17 CFR 242.612; The SEC is attempting a trial to test whether this Rule ought to be changed. For details of the new scheme, Securities and Exchange Commission, SEC Approves Pilot to Assess Tick Size Impact for Smaller Companies, Press Release, May 6, 2015, https://www.sec.gov/news/pressrelease/2015-82.html (a trial period begins in May 2016).

ability to quote prices that are within a penny meaningfully boosts the competitiveness of dark pools vis-à-vis public exchanges. With more traders entering dark pools, investor interest can migrate more quickly into ATS, replicating network effects common to exchanges.[155]

In summary, regulatory policy – in favoring competition over consolidation – has rapidly transformed the architecture of markets. From a handful of dominant trading venues, as was once the case, equity transactions in the U.S. are now fragmented across hundreds of venues and internalizing firms. An emphasis on competition as a primary dynamic underlying market design raises important questions about the quality of prices, liquidity and market stability under fragmentation. Finance scholarship has begun to wrestle with these inquiries, delivering a complex mix of evidence about the outcomes.[156] However, considered more deeply, fragmentation reveals a fundamental and unexplored schism in policy. Regulation has long relied on exchanges to perform a critical role in market governance, based on their assumed ability to gather a large swathe of the market into their institution, to monitor behavior and to exclude bad actors from an essential resource. The accuracy of this assumption is no longer self-evident. With fragmentation a defining feature of modern market structure, the role of exchanges in market governance merits urgent re-evaluation.

III. FRAGMENTATION AND PRIVATE GOVERNANCE

This Part examines the impact of fragmentation on the governance function of exchanges and trading platforms. It examines the challenge that national exchanges confront in fulfilling their mandate to oversee public companies and those that transact in their securities. To be clear, exchanges have long faced skepticism regarding their institutional capacity to govern. As noted earlier, scholars have questioned whether for-profit institutions like exchanges can properly perform the public service of governance.[157] And consolidated venues can make mistakes owing to the

[155] Amy Kwan, Ronald W. Masulis & Thomas H. McInish, *Trading Rules, Competition for Order Flow and Market Fragmentation*, J. FIN. ECON. (*forthcoming*).

[156] *See e.g.*, Hatheway, Kwan & Zheng, *supra* note 147; Zhu, *supra* note 142. Sabrina Buti, Barbara Rindi & Ingrid M. Werner, *Diving into Dark Pools*, Working Paper (2010) (noting the characteristics of the stock that is traditionally traded on dark pools). See also, Kwan, Masulis & McInish, *supra* note 154 (noting the potential for liquidity to be fragmented).

[157] Fleckner, supra note 1; Kahan, *supra* note 80; Karmel, *supra* note 1; For a comparison of incentives between mutual, member-owned incentives and for-profit institutions, Pirrong, *supra* note 44.

play of these problematic incentives or otherwise.[158] This Article does not revisit these debates. Rather, it highlights fragmentation as an entirely new and transformative challenge facing governance, arising as a consequence of regulatory efforts to deepen competition among trading venues. Any serious weakening of oversight comes at a high price. When market monitors fail, investors must pick up the slack to protect themselves. Transaction costs and disruptive markets can reduce the capital investors allocate to enterprises. This Part applies the logic of fragmentation in exchange design to examine the following: (i) diminishing returns of oversight; (ii) challenge of monitoring venues; and (iii) collective incentives to reduce oversight.

A. Diminishing Returns of Oversight

Governance is expensive.[159] Overseers confront a multitude of costs. To monitor markets, detect bad behavior and to punish instances of mistake, manipulation, fraud and poor governance, enforcers must devote significant resources to the task. These include not just the finances necessary to support the infrastructure for oversight, but also time, expertise and reputational investment to signal quality and assurance.[160]

Law and regulation place express responsibility on exchanges to exercise active supervision over listed companies and all those that utilize the exchange for trading. These include the broker dealers that bring their clients to the venue as well as market makers essential to maintaining the even flow of activity throughout trading. Beyond this, exchanges must maintain their own institutional integrity to safeguard their venue against malfunction, vulnerability to mishap or manipulation and to ensure that markets are continually supplied with fresh price information.

These tasks are – and should be – enormously resource intensive for an exchange seeking to perform them effectively. For a start, exchanges need to invest in building the systems necessary for market

[158] Notably, in the examples heighted earlier, the MF Global and Flash Crash debacles, allegedly originating on the CME, as well as the CBOE infraction, occurred on consolidated venues for the trading of derivatives.

[159] SECURITIES AND EXCHANGE COMMISSION, FISCAL YEAR 2014 AGENCY REPORT (2014), 35-43; For discussion on budgetary issues, Donald C. Langevoort, *Managing the Expectations Gap in Investor Protection: the SEC and the Post-Enron Agenda*, Georgetown Law and Economics Research Paper No. 328080, 3-4 (2002). See also, Howell E. Jackson & Mark J. Roe, *Public and Private Enforcement of Securities Laws: Resource-Based Evidence*, 93 J. FIN. ECON. (2009) (noting the regulatory intensity and costs of public-private investment in the U.S.).

[160] SECURITIES AND EXCHANGE COMMISSION, FISCAL YEAR 2014 AGENCY REPORT (2014), 35-43 (noting investment in hi-tech data, economic analyses and projected technological investment).

monitoring and surveillance. Commentators have highlighted the rising costs of this task, fuelled by exponential growth in technology and the data-intensity of modern, automated markets.[161] In response to regulatory pressure – as well as commercial need to attract business– exchanges have spent heavily on infrastructural upgrades to contend with automated traffic on their platforms. To take just one indicator, a study reports the NASDAQ increased the number of messages-per-second it transmitted into national market by 137% to reach 141,919 messages-per-second in 2011, a figure set to grow exponentially annually. This increase was driven by regulatory demand as much as by commercial need, essential to keep the market updated and to process the information of exchange trading activity.[162]

In updating these trading and surveillance systems, venues face a corresponding demand to maintain mechanisms that can also control disruptions that arise from time to time. These might include timely warnings to traders, or tools like circuit breakers that can rapidly halt problematic activity in case of spiraling difficulty likely to cause a precipitous crash. For example, circuit breakers were deployed to halt the spread of the Flash Crash – when the Dow Jones plunged almost 1000 points in a few minutes. The circuit breaker helped to "re-set" prices and to allow a recovery. Circuit breakers for individual securities as well as market-wide are now an essential tool in the regulatory arsenal available to exchanges.[163] That maintaining state-of-the-art trading and surveillance systems can prove costly is made clear by expensive glitches that have afflicted exchange systems.[164] The NYSE had to halt trading for almost four hours in July 2015 after a software update malfunctioned, causing an outage at 11:30am in the trading day. The update was designed to ensure compliance with requirements to time stamp trades in the NYSE.[165] Similarly, the NASDAQ experienced its own three-hour outage in 2013 owing to a software malfunction that stalled its order processing system.[166]

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[161] Securities and Exchange Commission, Consolidated Audit Trail, http://www.sec.gov/divisions/marketreg/rule613-info.htm; Christian T. Brownlees & Giampiero M. Gallo, *Financial Econometric Analysis at Ultra–High Frequency: Data Handling Concerns* (Universita' di Firenze, Dipartimento di Statistica G. Parenti, Working Paper No. 2006-3, 2006).

[162] Capgemini, *Trends in the Global Capital Markets Industry 2012: Financial Intermediary Firms*, 8-10 (2012).

[163] Kirilenko, *supra* note 103. Securities and Exchange Commission, Measures to Address Market Volatility, https://www.sec.gov/investor/alerts/circuitbreakersbulletin.htm (discussing limit-up, limit-down circuit breakers to halt trading activity if prices rise or fall too sharply beyond a set amount)

[164] Nathaniel Popper, *Nasdaq Is Fined $10 Million Over Mishandled Facebook Public Offering*, N.Y. TIMES, May. 29, 2013, at B4. The NASDAQ famously fumbled the launch of Facebook's IPO by failing to test and implement its order matching and communication systems for traders.

[165] Phillip Stafford & Robin Wigglesworth, *NYSE Outage Fails to Speed Up IT Upgrade*, FIN. TIMES, Jul. 9, 2015.

[166] John McCrank, *NASDAQ Says Software Bug Caused Outage*, REUTERS, Aug. 29, 2013.

In addition to monitoring and surveillance, exchanges must invest in actually enforcing market discipline. This is a particularly tricky task. As scholars have repeatedly remarked, exchanges face a conflict when called upon to discipline the traders and companies from which they derive their revenue. As for-profit firms, dependent on broker-dealers, market makers and publically listed companies for their gains, it is easy to see why exchanges might see a tension in fulfilling their dual obligations to their shareholders on the one hand – and to the marketplace on the other.

Exchanges have sought some institutional workarounds to deal with the conflicts that they confront. For one, they have established separate legal entities – distinct from the exchange itself – to carry out the actual business of overseeing and disciplining violations. Notably, the NYSE has established NYSE Regulation, a not-for-profit subsidiary of the NYSE that is charged with the tasks of leading the exchange's governance and enforcement efforts.[167] In addition, exchanges have also outsourced – to varying degrees – some of their governance responsibilities to the Financial Industry Regulatory Association (FINRA), the self-regulatory organization for broker-dealers. Instead of undertaking the tasks of enforcing breaches of certain exchange and securities rules themselves, exchanges can delegate an allocation to FINRA.[168] The solution is far from perfect – particularly as some observers have noted shortcomings in FINRA's enforcement intensity.[169] However, it offers a mechanism to blunt, in part, the perceived conflict of interests at the heart of exchange governance. Exchanges clearly tread a fine line in exercising governance, with their investments in maintaining infrastructure for monitoring and discipline generating high costs institutionally and operationally.

Fragmentation dramatically reduces the incentives that individual exchanges possess to invest in the mechanisms of governance. It imposes an entirely new dynamic that calls into question the ability of exchanges to meaningfully invest in oversight.

First, fragmentation raises the per-trade costs of governance, diminishing the financial incentives at play for exchanges to perform this task effectively.

Historically, exchanges have been well placed to internalize the costs of monitoring and discipline on account of the structural advantages

[167] NYSE, NYSE REGULATION, https://www.nyse.com/regulation.

[168] Sheppard Mullin, *Forward to the Past: NYSE Returns to Regulation*, Nov. 23, 2015, http://www.governmentcontractslawblog.com/2015/11/articles/regulations/forward-to-the-past-nyse-returns-to-regulation/; John McCrank, *Wall Street Watchdog FINRA to Monitor BATS' Markets*, REUTERS, Feb. 6, 2015. It is worth highlighting that the NYSE took back its allocation to the FINRA, such that NYSE Regulation will now be charged with enforcement, effective January 1, 2016.

[169] Andrew Tuch, *The Self-Regulation of Investment Bankers*, 83 GEO. W. L. REV. 101 (2015) (observing that FINRA's actions against investment bankers were relatively few).

of consolidation. Exchanges played host to public listings as well as to secondary trading in these listed securities. With exchanges guaranteed to see listing fees, trading volume, as well as reputational capital from their operations, effective investment in governance made business sense. Importantly, exchanges could privately reap the benefits of this oversight. If they governed effectively, then they could enjoy a large portion of the externalities generated by a job well done. Listed companies would be sounder economic prospects and traders better behaved, inviting more investors and more public companies to the venue.[170] With real skin-in-the-game, then, exchange had incentives to invest meaningfully in oversight, creating greater alignment between the private and public goals of governance.

These advantages break down in a fragmented marketplace. Exchanges see dramatically diminished volumes of traders reaching their venue, lowering fees and related business. Both the NYSE and the NASDAQ have witnessed sharp reductions in the market share. When the NYSE suffered its four-hour outage in July 2015, the market hardly reacted, with traffic diverted easily to other exchanges and dark pools. According to one commentator, this absence of panic reflected NYSE's sharply reduced share of overall equity volume, often hovering around the 1% mark during the day, with activity only intensifying in bursts at the beginning and close of trading.[171]

Lower market share poses a problem for exchange governance. Exchanges must pay a steady, fixed cost for overseeing the marketplace through infrastructure and institutional mechanisms built for the task – as well as ongoing monitoring and discipline. Their returns from this investment, however, are much lower. Exchange fees are less, given the diminished, uncertain volume. The efficiency of the investment is also more limited. In short, the full governance infrastructure must be supported by the activities of a much smaller reserve of traders.

Indeed, the returns of oversight are lower in fragmented markets also because exchanges face higher costs on account of investor choice. Competition encourages traders to shop for the best deal throughout the day across venues. To the extent that traders are strategically choosing where to trade at any given time, they increase the information costs that exchanges face in monitoring traffic through the their venue. Instead of relying on a regular set of repeat players, whose habits, behavior and strategies might be tracked over time, fragmentation creates a more fluid set of actors coming to the venue. Patchy information on a shifting set of

[170] Mahoney, *supra* note 17; Pritchard, *supra* note 78.

[171] Phillip Stafford, *Shrinking Trading Floor Does Not Reduce NYSE's Influence*, FIN. TIMES, Jul. 16, 2015.

traders can make it harder for exchanges to establish patterns of bad behavior. To the extent that exchanges see steadily lower volumes and vanishing revenues from trading, the motivation to expend resources on such analysis rationally grows much less compelling.

Secondly, within a fragmented market, exchanges do not internalize the full benefits of their investment in governing. Rather, competitors reap these gains – other exchanges, dark pools as well as internalizers that can free ride off the efforts of an exchange.

Competitively, exchanges must absorb the major costs of governance and monitoring. Recall, that ATS face fairly light obligations when it comes to oversight. ATS set rules to govern the behavior of traders on their venue – and nothing more. In a competitive marketplace, ATS have little incentive to exercise intensive oversight of those that come on the venue.[172] Moreover, ATS can save their own resources by relying on exchanges to police traders.

This uneven distribution of governance costs between exchanges and ATS can appear reasonable at first. Theory suggests that exchanges should see more volume on the venue given the strength of their networks and the attractions of transparency and sound oversight. Also, individual dark pools benefit by keeping volumes below the 5% volume threshold in order to enjoy the lighter regulatory regime. On this basis, requiring that exchanges carry the greater burden makes sense, given that they should have broader sight of traders and more to lose if something goes wrong. However, this rationale is problematic on the facts. While individual dark pools may try to keep within the 5% limit, exchange volumes too can now fall below or trade around this limit.[173] Moreover, by requiring exchanges to bear a higher cost (that they might pass onto their customers), regulation can create incentives for investors to move into the many dark pools and internalizing venues that are flourishing in the market.

Thirdly, higher regulatory costs per trade and an uneven distribution of regulatory costs between ATS and exchanges deepen the conflicts of interests that have always afflicted exchanges. Scholars have long highlighted the basic conflict of interest underlying exchange governance. Exchanges must discipline the very traders and companies that represent their source of revenue, market share and reputation. As for-profit institutions, exchanges face enormous tension in satisfying both their private accountability to shareholders and their public accountability for effective governance.[174] Increased competition and lower revenues can

[172] *See discussion supra* Part II(B) and (C).

[173] Stafford, *supra* note 170.

[174] *See e.g.,* Kahan*, supra* note 80; Karmel, *supra* note 1; Pirrong, *supra* note 44; For comparative discussion, Jackson & Gadinis, *supra* note 1.

motivate exchanges to seek out other sources of profit beyond the provision of trading services. There are numerous examples of emerging and current practices that showcase attempts by exchanges to bridge closer financial ties between themselves and their users, designed to raise revenues and the profile of an exchange vis-à-vis the competition.

For instance, it is commonplace for exchanges to pay traders that bring liquidity to the venue. Rather than simply charging a flat fee for transactions, venues can calibrate fees to reflect the benefit (in the form of liquidity) any particular trader brings to the platform. Exchanges can pay a trader to "make" trading opportunities by providing this liquidity to others and can charge a fee from one that "takes" them.[175]

To illustrate, Trader A submits an order offering to buy 100 shares of Public Company at $100 a share from anyone that wishes to sell. Trade A is thus providing liquidity. Trader B wants to sell and takes up Trader A's offer. Trader B thus takes liquidity. Instead of charging everyone a flat fee, the exchange can charge Trader B a fee of 50 cents because she succeeded in fulfilling her order (taking liquidity). Meanwhile, the exchange can *pay* Trader A a rebate of 30 cents for providing this opportunity (providing liquidity). Traders that act as counterparty to others can benefit by receiving a payment from the exchange, motivating them to step forward and act as a market maker. For an exchange, the gains come through recapturing volume and reputation. More importantly, exchanges make money from this arrangement. They pocket the difference between the fees they charge from "takers" and the money they spend on rebates to pay the "makers" (20 cents, in the above example). The more volume and investors that exchanges attract, through the promise of traders standing ready to trade, the more money the exchange can stand to make.[176]

Colloquially termed "maker-taker" fees, these arrangements have attracted considerable attention from scholars and policymakers for their impact on market quality.[177] While analysis of these larger questions is outside the scope of this Article, these fees highlight a close mutual dependence between the economic health of exchanges and high-volume

[175] It should be noted that ATS such as electronic communication networks also provide maker-taker fees. For discussion, Dolgopolov, *infra* note 177, 244-245.

[176] Theirry Foucault, Ohad Khan & Eugene Kandel, *Liquidity Cycles and Make-Take Fees in Electronic Markets*, J. FIN. (*forthcoming*)(noting the self-reinforcing dynamic between liquidity seekers and liquidity suppliers).); SCOTT PATTERSON, DARK POOLS: THE RISE OF THE MACHINE TRADERS AND THE RIGGING OF THE STOCK MARKET, 40-45 (2013).

[177] *See e.g.*, Kara M. Stein, Comm'r, U.S. Sec. & Exch. Comm'n, Remarks Before Trader Forum 2014 Equity Trading Summit (Feb. 6, 2014) (noting the potentially problematic aspects of maker-taker fees for investors). For discussion of the controversies surrounding maker-taker fees and a broad discussion regarding its interface with securities regulation, Stanislav Dolgopolov, *The Maker-Taker Pricing Model and its Impact on the Securities Market Structure: a Can of Worms for Securities Fraud*, 8 VA. L. BUS. REV. 231, 233-237 (2014).

traders.[178] In a fragmented, competitive marketplace, this interdependence heightens existing costs that exchanges face in enforcing discipline against active, liquidity supplying traders. Exchanges lose business; moreover, their competition gains if this higher volume moves elsewhere.

Beyond this fee structure, exchanges also offer a suite of services to users that now constitute lucrative sources of revenue. Exchanges sell data packages, promising more detail and faster information streams than what is publically available.[179] They sell real estate that secures physical proximity for users to exchange servers, facilitating speedier trading between the exchange and trader.[180] Tellingly, exchanges even offer advisory services to users designed to help them comply with obligations under exchange rules and corporate governance. [181]

Analysts have observed that exchanges have seen their revenues rise despite the noted fall in exchange volume. In 2014, the NYSE earned $762m of operating income. Between 2010-2015, the key exchange groups (covering the BATS exchanges, NYSE, NASDAQ) are reported to have seen a rise of 16% in their quarterly revenue, with a 62% growth in the revenue derived from technology and data services.[182]

Entrenched commercial relationships between an exchange and its users present difficult trade-offs for exchanges seeking to robustly enforce the rules. The basic conflict of interest remains: profit-seeking exchanges may be wary of taking action against major customers. However, the costs of this conflict may be more tolerable when exchanges can count on continuing, captive volumes of business as part of a consolidated market structure. Fragmentation deepens the conflict of interest. The exchange must think harder about taking disciplinary action against paying members. Enforcement can result in exchanges losing customers in an environment of falling volumes. Moreover, these customers can take their business to a competing platform. In addition, fragmentation encourages exchanges to seek profits by selling other services, like data and technology. Robust enforcement can dent these businesses as well.

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[178] Dolgopolov, *supra* note 177, 244-248 (on best execution duty to investors).

[179] *See e.g.,* NASDAQ GLOBAL DATA PRODUCTS, TOTAL VIEW FACT SHEET, http://www.nasdaqtrader.com/content/ProductsServices/DataProducts/TotalView/TotalViewProFactSheet.pdf; NASDAQ U.S. AND GLOBAL DATA FEEDS, http://www.nasdaqtrader.com/trader.aspx?id=dpspecs; NYSE, DATA PRODUCTS, http://www.nyxdata.com/Data-Products/Real-Time-Data.

[180] *See e.g.*, NASDAQ, CO-LOCATION, http://www.nasdaqtrader.com/Trader.aspx?id=colo. For discussion on co-location and proprietary data feeds, Yadav, *Insider Trading*, *supra* note 70.

[181] NYSE, GOVERNANCE SERVICES, https://www.nyse.com/governance.

[182] Stafford, *supra* note 170; Larry Tabb, *Stock Exchanges are Eating Your Returns*, BLOOMBERG, Jan. 22, 2016.

B. The Costs of Private Monitoring

This Article highlights the uneven allocation of regulatory responsibility between exchanges and ATS. Exchanges are subject to an expansive delegation of oversight responsibilities under the Exchange Act. ATS, however, face a far lighter burden. Transparency rules, too, diverge sharply. Whereas exchanges are continually posting quotes and updating prices, ATS can operate as virtual black boxes. This asymmetry raises significant concerns for market governance. In a deeply fragmented market, exchanges face high costs in monitoring activity on other trading platforms. Without this information, however, exchanges cannot fully determine the risks emerging on their own platforms and more broadly, on the national market as a whole.

The National Market System aspires to be an essentially singular economic space for trading securities.[183] Through the Order Protection Rule, the System works to generate a single best price for the whole market. To make this happen, trading venues are connected to each other through strong informational as well as operational links.[184] Brokers and dealers should be able to transact across multiple venues for their clients and attain the best available price as they do so.

The ability of exchanges to exercise effective oversight of the market faces a conceptual problem: traders can move easily across the System. Exchanges, however, can only monitor activity on their own venues. This leaves exchanges facing a "governance gap." Though Section 6 may envision a handful of exchanges safeguarding the securities market, fragmentation leaves exchanges able to logistically oversee only ever-diminishing parts, as more trading migrates to dark pools. With dark pools subject to much lighter regulatory requirements, exchanges faces risks arising from potentially riskier, less monitored areas of the market.

In a national market, with traders able to move fluidly across venues, exchanges face high information and co-ordination costs in satisfying their governance responsibilities. For instance, Section 6 requires exchanges to prevent fraudulent and manipulative behavior and to promote equitable trading. Fulfilling this statutory mandate presents a challenge where traders can transact across a variety of venues with different degrees of regulation. A fraudster may see a better chance of

[183] Securities Acts Amendments of 1975, Pub. L. No. 94-29 § 7, 89 Stat. 97, 111–17; Regulation NMS—National Market System, Exchange Act Release No. 34-51808, 70 Fed. Reg. 37,496, 37,532 n.300 (June 29, 2005) ("In 1975, Congress directed the Commission, through enactment of Section 11A of the Exchange Act, to facilitate the establishment of a national market system to link together the multiple individual markets that trade securities.").

[184] Gerig, *supra* note 33.

success by trading through a dark pool. If she wishes to engage in insider trading, she can buy or sell her shares on confidential information with greater ease by trading on an ATS with limited transparency.[185] If this fraudster also trades on an exchange from time to time, there are few simple means for the exchange to find out about her bad activities and to sanction them. Similarly, a trader intent on manipulation may strategically engage in a kind of "supervisory arbitrage" between lit exchanges and opaque ATS. For instance, she might split her orders between a lit exchange and a dark pool. She might submit a series of "sell" orders for Public Company shares on an exchange, depressing the market price. Following this, the Trader can venture onto a dark pool and purchase Public Company shares at the artificially depressed price without necessarily alerting the exchange or other traders.[186] Eventually, the market should return to its "efficient" price. And the price of Public Company shares should rise to its "efficient" mark. When that happens, the Trader can sell the shares on the dark pool at the higher price. Limited pre-trade transparency and delayed post-trade transparency on the dark pool makes it harder to connect the dots and determine whether a violation of exchange rules and securities laws has taken place.

Exchanges might have two possible options to monitor the market, despite fragmentation. First, they might monitor other exchanges and dark pools to overcome information deficits through intensive private policing. Exchanges might seek out information on the traders that use different venues, carefully scrutinize post-trade prices, or observe unusual trading on their own platforms that might connect with problem venues. Though appealing, however, this option is practically complex and likely too expensive to be feasible. Exchanges must investigate any number of dark pools, internalizers and communication networks. The costs of such investigations will be high. Exchanges would have to police an enormous volume of trading outside of their own venue and to do so cost-effectively. With information limited as a result of a lack of pre-trade and even post-trade transparency, these investigation costs are likely be too much for any one exchange to internalize privately.[187]

Alternatively, exchanges might police individual traders more diligently. Such intensive oversight would rest on the assumption that

[185] Matthew Coupe, *Dark Pools Need Clampdown*, FIN. TIMES, April 5, 2013.

[186] Recall that dark pools do not contribute to price discovery but utilize the exchange price to benchmark prices on the dark pool. For a study on manipulative techniques between a crossing network and an exchange, Mao Ye, *Price Manipulation, Price Discovery and Transaction Costs in the Crossing Network*, Working Paper (2012).

[187] The NASDAQ is seeking to develop dark pool surveillance. NASDAQ, SMARTS TRADE SURVEILLANCE FOR DARK POOLS, http://business.nasdaq.com/tech/surveillance/surveillance-solutions/smarts-dark-pools.

exchanges and ATS are home to a common pool of traders and investors that are simply moving from one venue to the next. By controlling the conduct and institutional characteristics of those that come to trade on their venue, exchanges can create externalities that benefit the system as a whole. That is, by forcing traders to behave better on their exchange (e.g. through better corporate governance), exchanges can ensure that the market generally becomes a place for safer traders.

Even here, the solution breaks down in practice. Intriguingly, emerging studies suggest that the investor populations of dark pools versus lit exchanges often diverge. Even though informed traders may be motivated to use dark pools to maximize the secrecy of their information, studies caution against simply assuming that dark pools comprise cohorts of informed traders. Interestingly, informed traders can face a number of problems when trading in a dark pool. If they are all informed about Public Company's real value, they may all trade similarly. In other words, informed trades are unlikely to be matched with other informed trades. This group would need a variety of traders including uninformed traders against which they can make money.[188] Dark pools – consisting largely of informed traders – are thus unlikely to do well. The risks of non-execution or overly expensive execution will be too high. Moreover, liquidity suppliers (market makers) will be reluctant to transact on a venue filled with informed traders. Market makers will predictably lose in such an environment, as informed traders win consistently.[189]

Instead, studies suggest that dark pools are, in fact, populated more heavily by *uninformed* traders rather than informed ones. As Professor Zhu posits, dark pools can be more attractive to uninformed traders. Ironically, as an indirect effect, this means that the proliferation of dark pools can leave public exchanges *more* informed, because savvy investors end up drawn to exchanges owing to the chance of smoother, reliable execution. Relatedly, finance theory suggests that market makers will move to venues with a higher population of uninformed investors – that then constitute easy targets for the market maker. Dark pools, should therefore be attractive to market makers that benefit by trading against groups of predominantly uninformed traders.[190]

[188] Andre Perold, *The Implementation Shortfall: Paper v. Reality*, 14 J. P'FOLIO MGMT 4 (2008); Robert Engle & Robert Ferstenberg, *Execution Risk*, NBER Working Paper 12165 (2006).

[189] Glosten & Milgrom, *supra* note 18 (noting that dealers transact as uninformed traders).

[190] This reflects the "cream-skimming" hypothesis, whereby off-exchange market-makers "skim off" uninformed traders and make money by trading with these actors. For an early discussion and comparison between the NYSE/NASD, Henrik Bessembinder & Herbert M. Kaufman, *A Cross-Exchange Comparison of Execution Costs and Information Flow of NYSE Stocks*, 46 J. FIN. ECON. 293 (1997) (finding evidence of cream skimming by off-exchange market-makers of uninformed traders).

This leaves exchanges in a difficult position in their efforts to monitor traders. The population of traders may not always be common between dark pools and exchanges. Uninformed traders may congregate more frequently on dark pools, or may be more willing to shift their business to dark pools from exchanges if this suits a particular strategy (e.g. the need to trade secretly). Similarly, stricter scrutiny by an exchange may encourage this migration to dark pools. It cannot simply be assumed that exchanges will always see a steady and common pool of traders that can be scrutinized and whose activities can thus be controlled effectively.

Furthermore, even if control is exercised by an exchange against a trader – for example, if an exchange demands that an Uninformed Trader keep more capital to reflect its trading on the exchange – this discipline may be insufficient. Without knowing fully what traders are doing on other venues, exchange discipline may inefficiently "price" the risk that the Uninformed Trader creates. Even if the Uninformed Trader keeps more capital to reflect the risks it takes on the Exchange, it may not be keeping enough capital to also reflect risks it also takes on the Dark Pool. If the Uninformed Trader is splitting its orders between an Exchange and a Dark Pool, it can create common risks and fail to pay for this conduct. Similarly, if the Exchange asks for better reporting of the trades, it cannot easily verify the veracity of this information without a robust knowledge of trading on the various dark pools in operation.

C. Private Risk at Public Cost

This Article shows that regulation splits governance responsibilities unevenly between exchanges and ATS. At first glance, this state of affairs places an enormous cost on exchanges to scour dark venues for information and to take an aggressive role in market discipline. An exchange is left at the mercy of other venues that are allowed to facilitate opaque transactions. Exchanges should thus have incentives to work harder to correct the informational and logistical deficits that they face.

However, this is not necessarily the case. The structure of the national market, where interconnected venues compete for business, points to an alternative account. That is, venues can gain from taking risks for private gain in the knowledge that the fuller costs of this risk-taking are borne by and shared between numerous other venues. In other words, venues benefit by collectively investing the minimum level of resources in governance, as the costs of failure can be absorbed collectively by the different exchanges and dark pools in the marketplace.

For a start, exchanges have little incentive to exceed a minimum level of investment in governance, not going beyond what is sufficient to control listed companies and traders on their own venues. Investing in tools to help bridge the gaps and asymmetries left by lesser-regulated venues is wasteful from the perspective of their own, profit-oriented interests. By going beyond what the exchange needs to do to keep its own venue safe, it confers value to its competitors. Other venues enjoy the benefit of safer traders and can attract them by the promise of cheaper services. Externalizing such benefits is harmful to an exchange. Not only does it allow a competitor to free ride on the exchange's efforts, but it can also encourage a competitor to exercise less than optimal oversight of its own venue. A competitor venue – relying on an exchange to do the hard work – has even stronger incentives to under-invest in monitoring its own venue for misbehavior. Exchanges can thus be wary of allocating excess resources to general oversight. Doing so risks enriching competitors and encourages these competitors to take on more risks, knowing that hard-working exchanges are picking up (at least some of) the tab.

The question arises whether exchanges, too, have incentives to be lax in overseeing their own venues – in other words, to do even less than the minimum desirable to secure their institution. On the one hand, it is clear that exchanges and dark pools face costly consequences when they fail in the exercise of good governance. The SEC fined the Chicago Board Options Exchange for falling short in the performance of its duties as a market overseer.[191] The CME faced enormous reputational damage following its failure to catch the mismanagement of client money at MF Global. And, the various glitches and malfunctions afflicting exchanges – like the NASDAQ and NYSE outages – have cast doubt on their robustness to offer a credible platform on which to transact.

However, interconnection and fragmentation can create incentives towards taking risks and cutting corners even in providing a minimum expected level of oversight. First, interconnection means that exchanges and dark pools can never be completely immune from a crisis on their platform even if they have taken all reasonable precautions to protect themselves. In the national market exchanges and ATS are intricately connected through transactional and informational links, such that traders and data can travel easily from one venue to the next. Scholars have remarked on the fast flow of information between exchanges, bringing high-speed efficiency to markets – but also enormous vulnerability to errors moving rapidly from one platform to another.[192] Put simply, this

[191] Securities and Exchange Commission, SEC Charges CBOE for Regulatory Failures, Press Release, Jun. 11, 2013, https://www.sec.gov/News/PressRelease/Detail/PressRelease/1365171575348.

[192] Gerig, *supra* note 18.

means that errors on an exchange or even dark pool can spread to other venues, creating costs that can quickly move beyond the confines of a single trading platform.

As seen in the May 2010 Flash Crash, an apparent failure to punish a bad actor on the CME is said to have contributed to a system-wide plunge across equity and other markets.[193] Worryingly, recent episodes of market volatility caused by stressed but foreseeable market conditions offer up further illustration of interconnected contagion. On August 24, 2015, owing to fears over the Chinese economy, the U.S stock market saw an historic plunge, with the Dow Jones Index tumbling over 1000 points within a few minutes of market opening. Trading platforms suffered 1,278 separate, sporadic trading halts in 471 different stocks and other securities through the day. While the structural causes of this extreme disturbance remain complex, one contributing factor appeared to lie in disjointed responses by different trading venues to the rapidly escalating price plunge. Because of the volatility, the NYSE opened its morning trading late in many of its listed securities on the day. Meantime, other exchange and ATS platforms on which these securities traded did not heed the delay and began trading as usual. By the time the NYSE did open, prices in various stocks were already falling and off-kilter because they could not reference the NYSE's opening prices. These fractured dynamics contributed to a day of chaotic trading halts across the network of exchange and off-exchange venues and placed significant pressure on their operational trading systems and shock absorbers.[194]

If an exchange does not internalize the full consequences of its risk taking, it can have fewer incentives to invest in the oversight of problem behavior undertaken on its platform. Unlike consolidated markets, when an exchange might expect to suffer deeply in case of its own regulatory failure, fragmentation can shift a portion of these costs to another exchange or dark pool. With risks moving easily to another venue, an exchange has a few options when determining its level of investment in regulatory oversight: (i) it can invest heavily in ensuring that its venue is aggressively policed, to maintain its own safety as well as that of other venues; (ii) it can invest just enough to ensure that its venue remains safe, but allowing risky behavior that externalizes costs to another venue; (iii) it can under-invest in oversight because risky behavior can generate profit. It also does not internalize the full cost of risk-taking if costs are also borne by other

[193] *See sources cited supra* note 103; Yadav, *Failure of Liability*, *supra* note 32.

[194] Bob Pisani, *What Happened During the August 24 "Flash Crash,"* CNBC, Sept. 25, 2015, http://www.cnbc.com/2015/09/25/what-happened-during-the-aug-24-flash-crash.html. For the SEC's inquest which failed to offer any conclusive opinion on the causes of the crisis, Securities and Exchange Commission, Equity Market Volatility on August 24, 2015, Research Note, 2-6 (Dec. 2015).

venues. And risks from other venues can migrate to the exchange despite the exchange's best efforts to secure the exchange.

Option 1: An exchange has little motivation to invest aggressively in oversight to control risks to itself and to others. As discussed above, doing so essentially transfers value from the exchange to a competitor.

Option 2: This option may be problematic for an exchange. While it may seem appealing for an exchange to just focus on protecting its own venue, implementing this goal is quite another matter. Unless exchanges can actually control traders and force them to trade only on their venue (rather than also on dark pools), simply focusing on policing a single venue is near impossible in fluid, fragmented markets.

If an exchange wishes to effectively police risks on its venue, fragmentation and interconnection in market design means that it must also engage in some monitoring and disciplining of risks that traders create on other venues. As above, this means that exchanges must invest in gathering information more fully, and understanding the behavior of traders on other venues (e.g. are they splitting orders between the exchange and a dark pool?). This approach can confer benefit to competitors, as described above. More problematically, it can mean an expenditure of effort where the gains are uncertain (and potentially reaped by others) and where the costs may be high in light of fragmentation across multiple venues.

Option 3: This option offers gains for exchanges charged with performing expensive oversight. Indeed, it arguably represents a rational allocation of regulatory resources. Exchanges that invest even in just minimal oversight of their own venue can confer a benefit to a competing exchange. Robust and holistic oversight similarly benefits others and undermines an exchange's profitability. Underinvestment in discipline can prove tempting. For one, lax oversight boosts profitability. It reduces the transaction costs a venue faces. It can also encourage volume to come to an exchange. Traders might be allowed to transact more freely. An exchange that boasts increasing volumes of traders might see a corresponding boost to its reputation. The exchange might even have room to reduce the costs it charges traders by way of fees or other services like data and technology.

Fragmented markets can encourage greater risk-taking by an exchange because it does not fully internalize the costs of its own bad governance. Risks can spread fluidly through the market. A disruptive trader can cause problems across multiple venues. For-profit, competing exchanges have little incentive to provision to contain risks that spread to other platforms.

Indeed, precisely because the costs of risks can be externalized to the market as a whole, single exchanges can harbor powerful incentives to take on larger risks than they might otherwise have done in a consolidated

market. Such risky behavior might manifest in different ways. Exchanges might be motivated to give traders enormous latitude as a means of competing for and attracting their business. This might include not only opportunities to transact riskily on the exchange but also softer enforcement for breaches. For example, exchanges routinely try to attract high-volume, opportunistic traders by the promise of rebates for their business even if the liquidity they provide may be transient and contingent on continued payment of these rebates. To maintain their business, exchanges can give such traders latitude in how they transact, such as through the availability of different types of orders that can help them trade flexibly and get ahead of others.[195] Dependence on such traders for liquidity (and profits) can invariably discourage exchanges from adopting too aggressive a posture vis-à-vis discipline. In any event, the costs of regulatory failure are not borne by the exchange alone. With the national market connecting venues to one another, a disruption on the exchange (e.g. a disappearance of liquidity that leads to a crash in prices) will likely reverberate widely across the system. A technological glitch may create ripples across multiple exchanges and dark pools, requiring these other venues to take steps to protect themselves. An exchange has limited incentives to foresee and provision for these system-wide risks *ex ante*.

Finally, underinvestment in regulation can be a rational strategy if an exchange or dark pool is inherently vulnerable to costs created by other venues in the national market.

Exchanges create costs for others through sub-optimal regulation. They can also be subject to disruption resulting from another's failure to invest in governance. It may not always be possible to determine where and how these risks might materialize. In a market comprising a large number of "dark" venues, investigating and curing informational deficits can be too costly for any one venue to do. Even with transparency, interconnection between venues can result in harms that may grow in seriousness as they proliferate across the different venues within the market. This interdependence and vulnerability to unpredictable risks can encourage a more carefree approach on the part of trading venues. If they know they can get in trouble anyway because of someone else's actions – and pay out for someone else's mistakes – it makes sense to also take profitable risks that can impose some external costs. Otherwise, careful exchanges are simply absorbing the costs of others, without any real pay-off for themselves. Indeed, diligent exchanges face a doubly bad outcome. For one, they are left holding the can, as other venues take risks, make

[195] Massoudi & Mackenzie, *supra* note 141 (noting the rise of order types and rebates designed to capture business from dark pools).

money, win business and perpetuate problems. But, their costs of doing business are also likely to be higher. While others capture business because of their lower transaction costs, diligent exchanges come out looking like expensive propositions. In a market where trading services are fungible and designed to be captured by the cheapest venue, a diligent exchange gets little reward for its efforts.

With unpredictable risks and competition underpinning trading, venues collectively face two broad choices: (i) to agree to invest heavily in governance as a means of protecting themselves and each other; or (ii) to take risks, compete and profit – even if the costs are borne by the system from time to time. With dark pools subject to much lighter regulatory obligations relative to exchanges, reducing any incentive to take serious care, the first option is clearly moot. This leaves exchanges and dark pools essentially left to compete and take risks, with the costs periodically externalized and absorbed by the system as a whole in an ad hoc manner. Sometimes, this institutional risk sharing can be beneficial. This was clear in the response of the market to the summer 2015 NYSE outage, as trading diverted smoothly to other venues. But, it can also be enormously concerning. As instances like the May 2010 Flash Crash show, venues can be subject to risks that may be deeply disruptive - whose costs can impact not just the trading infrastructure, but also the credibility of the system that underpins capital allocation.

This Article shows that fragmentation in market design diminishes the capacity of exchanges to exercise effective governance. It raises three areas of concern. First, fragmentation reduces the resources and reach of exchanges to oversee and discipline traders. Competition with cheaper, less transparent venues has placed exchanges on the back foot, losing profit and power to newer upstarts. With choosier customers, exchanges face deep information asymmetries and possess limited resources with which to overcome these deficits. Secondly, these informational deficits matter because fragmented markets make them especially costly to manage. If exchanges are supposed to provide frontline market governance, pervasive informational gaps should constitute a major source of concern for policy. Yet, with dark pools capturing large volumes of business and promising reduced transparency, these gaps are pervasive and near impossible for any single exchange to bridge cost-effectively. Thirdly, interconnected, fragmented venues have little incentive to invest in governance or to collectively come together to oversee the market. Rather, they can privately benefit through under-investment. An interconnected national market encourages venues to take risks in the provision of governance, garnering higher private gains but shifting the fuller costs of their indiscipline to others in the market.

IV. FROM FRAGMENTATION TO CONSOLIDATION

This governance gap ultimately creates systematic costs for the efficient allocation of capital. If exchanges are unable to properly fulfill their statutory mandate to police traders and public companies, the market loses a powerful source of discipline. To be sure, for-profit exchanges have long been problematic overseers, perceived as divided in their loyalty between their own profit margins and their duty to public good. Despite these concerns, however, law and regulation continue to entrust them with expansive power to supervise the flow of risk capital in the economy. As shown here, fragmentation in market design makes the effective realization of this statutory mandate costlier and much more uncertain.

This Part outlines thoughts for correcting the governance gap created by fragmentation in market structure. As a starting point, it examines the trade-offs of returning markets to a more consolidated structure. In the absence of this about-turn in policy, this Part suggests stronger emphasis on holding exchanges and ATS more directly liable for their failures in exchange governance. The goal of this proposal, one that builds on my earlier writings, seeks to force exchanges and ATS to focus more credibly on their responsibilities as regulators. Further, with stronger liability, trading venues can face a real cost that may offset negative incentives to take outsize risks in the provision of regulatory services. Finally, building on my prior work, this Article re-emphasizes the desirability of exchanges and trading venues all contributing to a shared fund to pay out on liability claims when single exchanges/ATS cannot. In seeking to force mutual contribution to a compensatory fund, the proposal encourages monitoring between venues and to hold each other more fully accountable for their failings in market oversight.[196]

A. Structural Consolidation

The costs of fragmentation for governance might suggest that policy has got things badly wrong in the last two decades. An emphasis on

[196] This Part builds on my writings in Yadav, *Liability*, *supra* note 32. *Liability* proposes stronger liability levers for exchanges in the context of riskss created by algorithmic trading and the failure of traditional liability standards to effectively constrain and punish traders for their errors, negligence and fraud in algorithmic trading.

competition as a regulatory objective sits in profound tension with the reliance we place on exchanges to keep markets safe. Fragmentation erodes the major structural advantages that exchanges possess when exercising oversight, those of network externalities and deep informational access into the marketplace. A proliferation of ATS – permitted to transact without the usual transparency rules – siphons off both high volumes of traders as well as the informational trails that these traders generate.[197] Exchanges are forced to work harder on a tighter budget to fill in these gaps, leaving investors exposed to higher risks if exchanges' own private, for-profit motivations take precedence over the public good.

At first blush, this should point to the benefits of pivoting back to the tried-and-tested model of consolidating trading venues into a handful of institutions that can return the benefits of networks to the market. Regulation ATS permits a plethora of non-exchange trading venues to thrive on account of lower entry and operating standards into the marketplace. From the structural standpoint, then, one large-scale response points to a deeper re-thinking around Regulatory ATS and whether non-exchange trading venues ought to become subject to much higher entry standards than are currently in operation. Heightened regulatory standards would increase the costs of business that any ATS confronts. The cheaper transaction costs of using ATS, as compared with exchange fees, are unlikely to withstand the twin challenges of acquiring trading volume and ensuring that users find transaction costs bearable at the same time. In the absence of a radically lower regulatory burden, ATS may struggle to develop the networks necessary to sustain the volume, provide services and also the savings needed to influence trader preferences.

To be sure, regulators have outlined possible reforms to tighten regulatory demands on ATS. For example, the SEC has proposed requiring ATS to disclose a much larger reserve of institutional information about their operations than prior rules have traditionally demanded. Whereas previously, ATS organizational disclosures could get away with providing "rudimentary" information (in the SEC's own words), reforms envision that ATS offer up more details about how they are run, who uses them, special services, any rebate arrangements, side-relationships between an ATS and any other affiliate or organization, and so on.[198] Such reforms seem well designed to cut down on the kind of abuses perpetuated by Barclays, for example, a firm that promised its users with a dark pool free of aggressive HFT traders, but consistently failed to deliver.[199]

[197] *See e.g.*, Kwan, Masulis & McInish, *supra* note 154.

[198] Davis Polk, SEC Proposes New Transparency Requirements for NMS Stock Alternative Trading Systems, Client Memorandum (Dec. 14, 2015).

[199] *See discussion and sources cited supra* Part II(A)&(B).

But, these reforms clearly do not challenge the fundamental notion of off-exchange trading and the essential place of ATS as venues designed to facilitate competition. Notably, reforms do not attack the basic lack of transparency underlying dark pool operations: low-volume venues still do not need to publish information on available quotes. To the extent that regulation wishes to maintain a place for dark pools within the marketplace, as a competitor to traditional exchanges, they are always likely to be subject to lower regulatory requirements vis-à-vis exchanges to enable competition to be meaningful and achievable in practice.

In many ways, greater consolidation offers a compelling solution to the costs of fragmentation. It is also one familiar to the market. But any reform designed to radically return markets to their state of consolidation – as an answer to the governance gap – must reckon with the fuller trade-offs this imposes on a market structure now accustomed to fragmented trading.

For a start, securities regulation seeks to achieve a number of goals. As part of its mission, the SEC aims to protect investors, maintain fair and orderly markets and enable better capital formation.[200] A consolidated market could well offer the best model to achieve these goals. However, it is not obvious that this will always be the case or be accepted as such by scholars, policymakers and investors. Consolidation, too, can have drawbacks. In particular, scholars remain divided as to whether a consolidated market structure necessarily delivers the most optimal efficiencies and trading outcomes. As discussed in Part I, they observe that investors continue to seek out opportunities to trade on other venues, notwithstanding the dominance of major exchanges and their network benefits. That is, even in consolidated markets, investors have, to varying degrees, always exercised some choice to transact outside of an exchange.[201] In looking to curb use of ATS, policy must first determine whether preserving investor choice in market design remains a goal worth pursuing. In coming to this determination, a few issues are worth considering. First, one might question whether investors will practically accept a sharp reversion back to the days when the NYSE and NASDAQ dominated almost all trading and listing. Dark pools have succeeded precisely because they appear to have provided investors with services that they could not find or did not wish to pay for in the lit public market. While the lack of transparency is rightly concerning from the point of view of market integrity, it clearly holds appeal for investors, driving volume

[200] Securities and Exchange Commission, What We Do, http://www.sec.gov/about/whatwedo.shtml.

[201] O'Hara & Ye, *supra* note 8 (for a literature review); Madhavan, *supra* note 22. As Professors Garabade and Silber note, even in consolidated markets with some competing venues, price discovery tends to happen in the larger, consolidated exchanges. Garbade & Silber, *supra* note 71.

and continuing interest in ATS. Besides the offer of opacity, ATS can also be cheaper, promising lower fees than on public exchanges. Having enjoyed this smorgasbord of choice, it is at least questionable whether investors will readily accept a return to a more rigid design. Indeed, Professor Larry Harris suggests that policy should not necessarily fix on consolidation as self-evident, given varied investor preferences and the chance that consolidation may end up being the wrong pick.[202]

Concretely, scholars have drawn mixed conclusions about impact of dark pools on key metrics of market quality like price efficiency. While a full discussion of this issue is outside the scope of the Article, opinions about whether dark pools are beneficial or harmful show deep divisions in opinion. A number of scholars point to the benefits of dark pools for market quality. For instance, scholars point to the tendency of dark pools to absorb more uninformed traders into their venue as a positive. Public markets may end up better informed as a result.[203] Dark pools can also help institutions dispose of large blocks of shares without disrupting markets or immediately disclosing investor intent.[204] At the same time, others express reserve, pointing out, for example, that excessive fragmentation in markets can damage liquidity on lit exchanges.[205] In all, firm assessments of the merits of dark pools vs. exchanges is currently elusive, viewed at least from the perspective of empirical finance scholarship.

These uncertainties create complex trade-offs for proposals to return to a more consolidated market. This Article demonstrates the enormous challenges – and costs – that fragmentation creates for market oversight. Taken broadly, some may suggest that these costs are offset by the gains for investor choice, or the possible benefits that ATS provide for market quality. Combined with path dependencies generated over the two decades during which investors have enjoyed greater optionality in trading, a dramatic about-turn towards consolidation can start to look unfeasible.

B. Economic Consolidation

Short of structural consolidation, trading venues can be pushed towards better market governance by a stronger threat of legal liability and

[202] Lawrence E. Harris, *Consolidation, Fragmentation, Segmentation and Regulation*, 2 FIN. MKTS. INSTITUTIONS & INSTRUMENTS 1, 4-10 (1993).

[203] *See e.g.*, Zhu, *supra* note 142 .

[204] Peter Gomber et al., *Competition Between Equity Markets: Evidence from the Consolidation Versus Fragmentation Debate*, SAFE Working Paper No. 35 (Feb. 2016).

[205] Kwan, Masulis, McInish, *supra* note 154,6-7 (discussing mixed conclusions).

a collective liability for market-wide harms. Historically, exchanges have enjoyed very wide immunity from liability in the performance of their regulatory functions.[206] The centrality of exchanges to market integrity, however, ensures that their failings carry enormous financial and expressive consequence. A systematic degree of error, misinformation and fraud can impact the value of securities across the board and leave investors and public companies to bear the costs of an exchange's poor oversight. Normatively, investors-at-large and public companies are not expected to internalize the costs of exchanges falling short in their statutory duty to oversee the marketplace: statute is clear in giving exchanges a strong and expansive role in oversight. While consolidated exchanges might have had structural advantages in fulfilling this goal, fragmentation does not absolve them of this role. However, fragmentation does raise structural challenges to the exercise of oversight, as set out in this Article. In the absence of consolidation, it follows that the application of the statutory mandate adapt to the reality of fragmented markets.

Liability for Trading Venues: This Article shows that governance is undermined in three key ways: (i) exchanges carry the main weight of liability relative to ATS, but see an ever-diminishing fraction of trading volume. With less money and dimming sight of traders, governance is likely to be compromised; (ii) exchanges cannot effectively monitor other venues; and (iii) the national market creates incentives for venues to privately profit from risks at a cost to the System has a whole.

This analysis points to the desirability of moving to a framework in which exchanges and trading venues are able to: (i) better internalize the costs of sub-optimal governance; and (ii) develop incentives to monitor each other alongside systematic tools that facilitate this self-policing.

In earlier writings, I have proposed stronger liability for exchanges.[207] But risk sharing between exchanges and ATS points to the desirability of imposing liability for governance failures on both ATS as well as on exchanges. As a first matter, this necessitates grounding this liability within the context of a broader duty to govern, applying not only to exchanges but also to ATS. While ATS might continue to benefit from regulatory leeway (e.g. in the lack of transparency), enlarging the scope of the governance mandate to cover ATS as well as exchanges appears

[206] Sparta Surgical Corp. v. NASD, Inc., 159 F.3d 1209, 1213 (9th Cir. 1998) (immunity for exchanges in their exercise of quasi-governmental power); Barbara v. New York Stock Exchange, No. 631, Docket 95-7471. (2nd Cir. 1996) (giving exchanges immunity for suits arising out of disciplinary proceedings). But see, Weissman v. NASD, Inc. (Weissman IV), 500 F.3d 1293, 1299 (11th Cir. 2007) (distinguishing between acts carried out in the commercial interests of exchanges and their regulatory power). For discussion, Craig Springer, *Weissman v. NASD: Piercing the Veil of Absolute Immunity of an SRO under the Securities Exchange Act of 1934*, Working Paper (2008).

[207] Yadav, *Liability*, *supra* note 32.

straightforward from the policy standpoint. ATS host traders in the same national market system securities as exchanges. Moreover, risks can spread from ATS to exchanges (and vice versa) given the informational and logistical connections at play. A marked asymmetry in the governance burden carried by exchanges and ATS appears formalistic, leaving the market vulnerable to opportunistic traders and the failings of a single careless trading venue. Just as exchanges are required to ensure that they assure compliance with securities laws and prevent fraud and manipulation, similar requirements may be expressly extended to ATS. Regulators have proposed measures requiring ATS to disclose more about detail about their operations. It seems fitting to also deepen their role in governance as a means of ensuring that ATS pre-commit to a basic standard of organizational quality, leaving venues free to compete on other services. This might mean, for example, that ATS also ensure compliance with securities laws, particularly as these relate to fraud, manipulation and insider trading. Given the lack of transparency on ATS, an explicit assumption of legal duty to prevent misbehavior and misconduct can offset the risks of traders utilizing ATS for supervisory arbitrage and deceptive behavior. In addition, ATS might vet those that utilize their venue more strictly. Differing entry standards between ATS and exchanges may encourage less qualified traders to utilize ATS for potentially risky trading. If ATS do not wish to invest in vetting traders, they might instead rely on existing exchanges to certify traders and for this certification to then qualify traders to transact freely across ATS.

Rather than giving trading venues latitude and immunity, as the law has done, fragmented, interconnected markets point towards imposing more searching liability in case of governance failures by trading platforms. The scope of this scrutiny is deliberately broad. In past work, I have suggested that exchanges be held secondarily liable for instances of error, negligence or fraud occurring in substantial part through using the mechanisms of trading, where the trader causing this harm is unable to adequately cover the compensation for the loss she causes. In other words, exchanges stand ready to cover the monetary shortfall in cases where traders are unable to pay for the damage they cause on their venue. In addition, and in some instances separately, liability may be imposed for instances where exchanges have been to have fallen short in their exercise of their governance functions and caused losses for the market.

First, an *ex post* compensation mechanism aims to foster *ex ante* incentives for exchanges and ATS to take a rigorous governance role. Governance failures may be implicated in cases where traders cause large losses. This can make a stronger case for holding exchanges secondarily liable when a trader is unable to meet the full cost of liability herself.

When traders make costly mistakes – so large that they cannot pay for it themselves – exchange/ATS oversight failures are likely to come to the fore. Why was a trader permitted to take on risks that for which she could not adequately provision? Why were these risks able to materialize in a systemically damaging and costly manner for the marketplace? Why did monitoring mechanisms fail to detect instances of egregious trader misbehavior? To the extent that exchanges and ATS have their own pocketbooks on the line, one might expect them to attack instances of potential misbehavior more forcefully. But exchanges may be liable themselves for sub-optimal governance of markets.. This might happen, for example, if they install poor quality infrastructure, if they put their own business interests conspicuously ahead of the public good (e.g. CBOE) or if the failure to co-ordinate between venues contributes to deeper, more damaging harms to the market. Put more simply, exchanges and ATS should be seen to have, and actually have, a tangible stake in market oversight. This should improve market governance as well as encourage greater confidence on the part of regulators and investors in the ability of trading venues to fulfill their statutory mandate.

Secondly, the threat of *ex post* liability can reduce the incentives of traders to take private risk at the expense of the market system. Venues may be willing to overlook instances of misbehavior on their platforms in the interests of attracting volume, lowering transaction costs and building a profitable user base. A hands-off approach to governance and discipline can be rational, if some of the losses accrue to and are shared with other competing exchanges and ATS. The threat of liability for an ATS/exchange can provide a corrective to these distorted incentives. By imposing costs on any motivation to riskily govern the market, a liability framework can reduce the inclination of trading venues to extract private benefit at a cost to the Market as a whole.

Collective Liability and Monitoring: In earlier work referenced above, I proposed establishing a Market Disruption Fund, representing a shared fund financed by exchanges to help defray the costs of damage in cases where a single exchange cannot do so.[208] Underlying this proposal is the concern that a single venue may not always have the resources to pay out on a large claim in an interconnected market. A problem might start on one exchange or ATS and then rapidly mushroom across several venues, leading to a potentially large claim. If the liability regime underlying market structure lacks credibility, it struggles to constrain bad actors or to assure investors about the protective potential of exchange governance.

[208] Yadav, *Liability*, *supra* note 32.

The design of such a Fund would meet three key criteria: (i) to compensate investors that lose on account of a failure by an exchange or ATS to meet its governance responsibilities; (ii) to reduce any moral hazard on the part of exchanges or ATS to take risks knowing that the Fund is available to pay out on any claim; and (iii) to force exchanges and ATS to more actively monitor each other as a means of private discipline. With respect to (i) and (ii) above, a Fund might require that all those participating in the trading of NMS securities contribute to its reserve in accordance with a set of established criteria (e.g. by proportion of equity volume). In the event of a covered loss, the Fund can pay out to an aggrieved party, first dipping into the reserves of the wrongdoer before using up contributions by other venues. If one or more venues are implicated, the Fund can access the contributions of those chiefly involved. Importantly, to reduce moral hazard, risky, disruptive venues are the first to pay out. To the extent these venues are not wiped out by liability, the Fund may require them to pay in extra funds after the fact in acknowledgement of their deficiency. Much like tried-and-tested mechanisms in insurance, the Fund represents a mechanism for the market to protect itself against risk, to make good on any losses and to reduce the chances of bad actors to behave disruptively owing to this backstop.

Importantly, with respect to (iii), such a Fund would create an institutional mechanism to incentivize venues to better police one another. This Article shows that exchanges and ATS cannot easily verify that others are complying with their governance obligation. A shared liability fund can motivate exchanges and ATS to better oversee each other's conduct. An industry fund should also provide an institutional locus of interests in the market. It can thus push venues to come together to co-operate in the exercise of exchange governance, to share information and pool monitoring resources. Underlying this motivation – to some degree – is the expectation that industry self-policing can help to discover and root out weak links in the national market. Institutions that cannot contribute to the Fund or those that show up as responsible for repeated failures ought to see reputational sanction as well as industry discipline, designed to eventually price them out of the market (e.g. through individual liability, higher contributions to the Fund/sanction by public regulators). To some extent, an example of some institutional co-operation is offered by FINRA, the industry self-regulator. However, without skin-in-the-game through private liability and financial interdependence through shared liability, incentives to exercise industry self-monitoring and discipline are too weak to be workable. In this absence, the market cannot continue to rely on exchange governance as a central pillar of the regulatory superstructure.

V. CONCLUSION

Regulation places profound reliance on exchanges to ensure that markets operate efficiently. Critical to the allocation of capital from investors to productive enterprises, exchanges constitute a lynchpin underpinning economic function in the U.S. Recent years have witnessed a transformation in the structure of securities markets. Instead of relying on the network externalities and informational reserves generated by traditional exchanges, regulation has instead privileged competition as a governing objective in market design, resulting in a proliferation of trading venues. While fragmentation may have brought benefits in the form of lower fees and a plethora of optionality for investors, it has also extracted a heavy price from the system as a whole. Exchanges are deeply diminished in their ability to effectively govern markets. Lower revenues, fierce competition and incentives to take profitable risks have placed venues on the back foot in their ability to oversee an innovative, sophisticated and constantly mobile market. The cost, invariably, is ultimately borne by investors, public companies and by the market that can no longer rely on the protective oversight of exchanges to allocate capital. This Article provides the first analysis of this fundamental problem facing regulatory policy and outlines steps for potential reform. In the absence of action, regulation and the public purse must carry a far higher burden to ensure the proper functioning of markets.