DARK POOLS AND THE DECLINE OF MARKET GOVERNANCE

YESHA YADAV[†]

ABSTRACT

Regulation requires securities exchanges to play a critical role in oversight. By statute, exchanges are required to enforce securities laws and to maintain a marketplace that is free of fraud and misbehavior. On its face, this delegation of regulatory authority makes considerable sense. Exchanges bring together a large number of market users, giving them access to information and expertise about their activity. An exchange's disciplinary power should also have real bite. A threat to exclude a user from an essential economic resource constitutes a powerful motivator to promote good behavior. This Article shows exchanges cannot realistically fulfill this regulatory mandate in modern markets. This Article makes three contributions. First, it shows that today's market structure is characterized by heavy fragmentation in the provision of trading services, with equity trading divided between a multitude of competing exchanges and around 30 lightly-regulated, non-exchange venues (so-called "dark pools"). Far from convening large numbers of users, exchanges are struggling to keep their trading business from migrating to less-regulated dark pools. Fragmentation also increases the costs of performing oversight. Exchanges face deep structural information gaps as traders transact across multiple venues. Their disciplinary power is also diminished as bad actors can switch to another exchange or dark pool. Secondly, I argue that exchanges have incentives to be lax in delivering oversight. Within an interconnected network of competing venues, expenditure in oversight benefits an exchange privately but it also confers value on competitors. Additionally, an exchange can gain by sub-optimal oversight. It wins by lowering the compliance burden for users and thus capturing business for itself. But the full costs of failure are shared with competing venues as the impact of disruptions is felt throughout the market. Ultimately, poor

[†] Professor of Law, Vanderbilt Law School. I am enormously grateful for conversations, insights and discussions in relation to the preparation of this Article. For their perspectives and thoughts, my sincerest thanks are owed to Professors Adam Badawi, Nicholas Bageley, Michael Barr, Brad Bernthal, Margaret Blair, Chris Brummer, Anthony Casey, Sherman Clark, John Coyle, Stanislav Dolgopolov, Sean Foley, Elizabeth de Fontenay, Kathryn Judge, Scott Hershovitz, Cathy Hwang, Elizabeth Pollman, Bob Reder, Morgan Ricks, Robert Rhee, Mark Schein, Danny Sokol, Urska Velikonja, Jack Wroldsen, Pradeep Yadav and to participants at the University of Colorado Business Law Scholars conference, the University of Florida Faculty Workshop and the American Society for International Law Biennial. All errors are my own.

oversight by exchanges hurts capital allocation. If exchanges cannot properly police the market, investors will reduce the value of their capital to reflect the risk – or they might exit the market altogether. In its third contribution, this Article proposes the creation of a new liability regime for exchanges and dark pools to hold trading venues more fully accountable for failures in oversight. Liability tilts the incentives of exchanges towards fulfilling their statutory mandate by creating real costs where they fail to do so. Without liability, this mandate is ineffective in fragmented markets and unable to fulfil its goal of assuring safer markets through robust private oversight.

TABLE OF CONTENTS

INTRODUCTION

On August 24, 2015, the U.S. equity market experienced its biggest ever drop, falling 1,100 points in the first five minutes of trading.[1] The stock market lost almost 5% in value, with securities of household names like J.P. Morgan, General Electric and Ford, plunging by more than 20%.[2] In this chaotic start to the day, trading began inauspiciously. The New York Stock Exchange (NYSE) – tasked with providing the market with an opening indicative price for its listed securities – struggled to do so. By 9:40am, running ten minutes behind schedule, around half of all of NYSE's listed securities had not begun trading on the exchange.[3] They had, however, begun to trade at the usual time on some of the other national exchanges and off-exchange venues, without the benefit of key price information from the NYSE.[4] In light of the NYSE's delay, alongside a market already deep in turmoil, circuit breakers – triggered by exchanges during periods of extreme stress – halted trading over 1,200 times during the day.[5] Crucially, the securities market failed to overcome the morning's difficult start. Rather, the (then) 12 national equity exchanges and several dozen, lightly regulated, "alternative trading systems" (ATS), intensified the spread of the chaos.[6] Different trading platforms applied their circuit breakers idiosyncratically, as prices veered off kilter from what they

[1] Matt Egan, *Trading Was Halted 1,200 Times Monday*, CNN MONEY, Aug. 24, 2015.

[2] BLACKROCK, *US Equity Market Structure: Lessons from Aug. 24*, (Oct. 2015), https://www.blackrock.com/corporate/en-au/literature/whitepaper/viewpoint-us-equity-market-structure-october-2015.pdf.

[3] BLACKROCK, *US supra* note [2], 6-8. The NYSE triggered special procedures on days of high volatility, pursuant to its Rule 48, to implement special procedures in making its pre-opening prices. NYSE, Rule 48: *Exemptive Relief – Extreme Market Volatility Condition*, available at http://nyserules.nyse.com/NYSETools/PlatformViewer.asp?selectednode=chp_1_3_7_14&manual=/nyse/rules/nyse-rules/.

[4] Securities and Exchange Commission, *Research Note: Equity Market Volatility on August 24, 2015*, Dec. 2015, 3-4, https://www.sec.gov/marketstructure/research/equity_market_volatility.pdf.

[5] Bob Pisani, *What Happened During the Aug. 24 Flash Crash,* CNBC, Sept. 15, 2015, http://www.cnbc.com/2015/09/25/what-happened-during-the-aug-24-flash-crash.html; BLACKROCK, *supra* note [2], 1-3, 6-8; Austin Gerig and Keegan Murphy, *The Determinants of ETF Trading Pauses on August 24th*, 2015, https://www.sec.gov/marketstructure/research/determinants_eft_trading_pauses.pdf. These mandatory circuit breakers have been put in place following the May 2010 Flash Crash, during which the U.S. stock markets fell by around 1000 points suddenly and without explanation, before rebounding. The circuit breakers – known as Limit-Up, Limit Down circuit breaker is triggered when stock prices swing outside of prescribed bands for stocks. These circuit breakers usually halt trading for five minutes to give time for the market to soak up the volatility in the stock.

[6] On ATS, see discussion *infra* Part [II(B)]; Pisani, *supra* note [5]; Egan, *supra* note [1]; BLACKROCK, *supra* note [2], 6-8. Since the 2015 Crash, the Investors Exchange (IEX), formerly an ATS, was authorized as a national exchange in the summer of 2016. Nicole Bullock, *IEX Trading Venue Wins Battle to be an Exchange*, FIN. TIMES, June. 17, 2016, https://next.ft.com/content/9d97bef0-34a9-11e6-ad39-3fee5ffe5b5b; 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 Exchange Act, SECURITIES AND EXCHANGE COMMISSION, EXCHANGES, https://www.sec.gov/divisions/marketreg/mrexchanges.shtml.

should have been.[7] Uncoordinated, unplanned, trading halts resulted in further price convulsions.[8] Unsurprisingly, given the growing unease, panicking investors sold their securities at steeply depressed prices, prompting additional downward pressure on stock valuations.[9]

The events of August 24 highlight the critical role of institutional design in maintaining the proper functioning of U.S. securities markets. They underscore, in particular, the fragmentation that now characterizes U.S. market structure, with equity trading divided across a network of 13 national exchanges as well as around 30 or so ATS (colloquially known as *dark pools*).[10] Whereas the NYSE and NASDAQ remain the major exchanges for companies looking to list their shares in a public offering, they are no longer the go-to venues when it comes to investors trading these securities with one other in the secondary market. By dint of regulation, publically listed equity may be traded anywhere within the network of national exchanges and dark pools, with investors able to transact on the platform that offers the best bargain.[11] Because dark pools

[7] Pisani, *supra* note [5]; Egan, *supra* note [1]; BLACKROCK, *supra* note [2], 6-8; Gerig & Murphy, *supra* note [4] (on the impact on exchange-traded funds, that suffered significant price swings and disconnects from the price of securities referenced by major exchange-traded funds). As commentators noted, prices that are normally correlated were no longer correlated. While JP Morgan's share price fell by 20%, Morgan Stanley's shares did not, even though share price movements of these two stocks are normally correlated. This suggested that JPM's prices were disproportionately affected by trading delays. BLACKROCK, *supra* note [2], 6-8,

[8] Pisani, *supra* note [5].

[9] BLACKROCK, *US supra* note [2], 6-8.

[10] Determining the number of ATS is quite problematic. ATS can also include electronic crossing networks (or ECNs) that disseminate order-related information to their users and match buy and sell orders between their clients. These networks thus have transparency, unlike other ATS venues that do not have to display pre-trade price information. This Article uses the number of platforms that report active weekly trading data to FINRA. It should be noted that FINRA can exempt certain ATS from the reporting requirement. The number of ATS, of varying degrees and types of trading activity, registered with the SEC is much larger, numbering just over 80 venues. This number is constantly in flux. See, SECURITIES AND EXCHANGE COMMISSION, ATS LIST, https://www.sec.gov/foia/docs/atslist.htm (July 2017); FINRA, ATS TRANSPARENCY DATA, https://ats.finra.org/TradingParticipants; FINRA, EQUITY ATS FIRMS, http://www.finra.org/industry/equity-ats-firms (Jun. 6, 2017); For discussion, 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; On ECNs within the taxonomy of ATS, Laura Tuttle, *Alternative Trading Systems: Description of ATS Trading in National Market System Stocks*, SEC Division of Economic and Risk Analysis, 9-10 (Oct. 2013).

[11] It should be noted that not all national exchanges list securities. Exchanges divide into those that list securities, and those that trade the securities of companies that are listed on another exchange. The two major listing exchanges are the NYSE and the NASDAQ. For discussion on the significance of exchanges and their continuing role in the listing process, Onnig Dombalagian, *Exchanges, Listless?: The Disintermediation of the Listing Function*, Tulane University School of Law Public Law and Legal Theory Working Paper Series Working Paper No. 15-10, 2, 7, 15-16 (June 2015). On the obligation to execute trade at the best price, see, Regulation National Market System Rule 611, Order Protection Rule, 17 CFR 242.611 (2005). Some venues offer certain services to attract orders to their venue. See, for example, IEX Trading Alert 023 (Nov. 3 2013), http://www.iextrading.com/trading/alerts/2014/023/; IEX, About IEX, http://www.iextrading.com/about/.

are subject to a lighter regulatory regime relative to exchanges, including reduced transparency requirements, they can offer investors cheaper services as well as the opportunity to transact with greater secrecy.[12] In other words, equity market structure is defined by two dueling types of venue: exchanges that are subject to the full panoply of regulatory stipulation; and dark pools that can trade equity alongside exchanges but under a much less exacting regulatory regime.

The availability of multiple competing platforms within the national market has eroded the overall volume of equity trading handled by the NYSE and NASDAQ. Whereas NYSE once attracted around 80% of share volume in the securities it listed, its group of exchanges now handle only around 23% of all U.S. equity volume, with NASDAQ at approximately 18%.[13] Dark pools, by contrast, have gained an increasing slice of the pie. In July 2017, they attracted around 37% of U.S. equity trading volume,[14] intermediating almost as much U.S. equity trading volume on their platforms as the NYSE or NASDAQ put together.

This shift from a consolidated marketplace – where NYSE and NASDAQ dominated both the listing and the trading business – to one where major exchanges compete for investors in a fragmented market, raises serious questions for regulatory policy. First, the obvious inquiry is whether today's security market is working more effectively than eras past to allocate capital and help investors manage risk. Finance scholars have written extensively on whether the transition to fragmentation is making markets more efficient, cheaper for investors, and where liquidity – the easy availability of trading opportunities – is plentiful.[15] Findings on these metrics remain mixed, with finance scholars continuing to pursue research to probe for more conclusive answers.[16]

---

[12] Nathaniel Popper, *As Market Heats Up, Trading Slips Into Shadows*, N.Y. TIMES, Mar. 13, 2013, B1; See discussion infra Part [II(B)]. Note, however, that contrary to widespread belief, dark pools are not generally used to only execute large block trades. The average trade size is around 200-300 shares. See, for example, Tuttle, *supra* note [10].

[13] BATS, VOLUME SUMMARY, https://www.bats.com/us/equities/market_statistics/ (Jul. 2017); 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/. See also, Mark Fahey, *Dark Pools Still Popular Despite Year of Regulatory Concern*, CNBC, Feb, 1, 2016.

[14] BATS, VOLUME SUMMARY, https://www.bats.com/us/equities/market_statistics/ (Jul. 2017); Ju, *supra* note 18; 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.

[15] *See sources and discussion infra* Part [II(B)(C)].

[16] *See sources and discussion infra* Part [II(B) II(C)].

But a more fundamental inquiry, critical to the first, remains unasked and unanswered: are today's markets subject to better oversight than in eras past? And specifically, are exchanges institutionally capable of supervising markets and enforcing securities rules and norms in a heavily fragmented market structure? This query is a fundamental one from the legal standpoint as well as that of economic theory.

Legally, national exchanges like the NYSE and the NASDAQ are required, by statute, to exercise vigilance over securities markets, to enforce all securities rules and to maintain a trading environment that is free of fraud and manipulation.[17] In return for exercising private oversight, exchanges enjoy certain privileges, most notably the grant of a qualified legal immunity in the performance of this task.[18] From the economic lens, it is easy to see why exchanges are tasked with this supervisory role. Historically, they have long constituted deep hubs of economic activity, bringing together public companies, traders and investors within their institution. The NASDAQ lists the securities of 3,600 companies representing a market value of more than $10 trillion; the New York Stock Exchange (NYSE) hosts 2,400 companies with a market capitalization of $25.8 trillion. In 2015, the NYSE saw between $24 billion to $118 billion worth of trading volume in its listed securities over a single day.[19] The NASDAQ routinely sees over one billion shares trade daily.[20]

[17] *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).

[18] 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); 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).

[19] NASDAQ, ACCESS CAPITAL, http://business.nasdaq.com/list/index.html; NYSE, NYSE CELEBRATES 2017 AND LOOKS FORWARD TO 2017, https://www.nyse.com/2016-year-in-review#video; 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 quotation system, rather than a full exchange. 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 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.") 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

As essential economic focal points, exchanges can have eyes on a large swath of the market. Their economic centrality also confers unique disciplinary power. The threat of excluding a user from the exchange or denting her reputation among peers will likely be seriously detrimental to her profits, motivating good behavior from self-interested actors. As observed by Professor Brummer, power and position help exchanges transmit regulatory policy to large segments of the the market, fostering conformity with securities laws and industry norms.[21]

Importantly, because regulation requires exchanges to take a lead role in monitoring markets, individual investors do not have have to use their own private resources to do so. By avoiding duplicative, costly monitoring, investors can allocate the fullest value of their capital to investment, rather than discounting it to reflect their private expenditure in oversight. Most broadly, markets that attract a fuller mix of investors will also be more efficient in allocating capital to profitable companies. Where investors do not have to worry about carefully policing other traders or the public companies in which they place their wealth, they can focus resources on better researching and pricing the risks they assume.[22]

In responding to the question on the quality of private oversight in today's fragmented markets, this Article offers three contributions.

First, I show that fragmentation creates enormous logistical and institutional costs for exchanges that make it near impossible, in practice, for exchanges to exercise reliable oversight of securities markets. Exchanges work best by convening a large number of users within their venue.[23] Numbers help traders find one another and strike deals.[24] They generate "network externalities," whereby a large number of users attracts even greater numbers owing to the benefits of an active, efficient marketplace.[25] From the perspective of regulation, numbers enable

---

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).

[20] 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).

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

[22] *See discussion infra* Part [I(A)& I(B)].

[23] 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.).

[24] Jackson & Gadinis, *supra* note 19, 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.

[25] Haim Mendelson, *Consolidation, Fragmentation & Market Performance*, 22 J. FIN. QUAN. A. 189 (1987) (observing the benefits of market consolidation and network externalities for exchanges);

exchanges to deliver efficient oversight.[26] A repeat base of users provides information; it develops and hones an exchange's expertise over time; and it amplifies an exchange's disciplinary power by giving real teeth to its threat to exclude a user from accessing an essential economic resource. [27]

Fragmentation damages the capacity of an exchange to conduct oversight by sharply reducing the number of users that an exchange attracts. This dramatic reduction of the user base harms the delivery of exchange oversight in key 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.[28] 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 dark pools that also host trading in its listed securities. As seen in the August 24 market crash, a delay on the NYSE spread costs to other exchanges and dark pools rapidly. Even though the NYSE had not started trading its securities at the 9:30am opening, its listed securities still traded on other venues, though without the benefit of price information that the NYSE would normally provide.[29] As a result, prices swung out-of-sync, causing economic losses where securities traded at inaccurate prices, and ultimately caused a day-long headache for investors and regulators.

But a fragmented market structure also gives fraudsters, insider-traders or manipulators choice about where to transact – on exchanges or on opaque dark pools. This can encourage bad apples to creatively craft opportunistic, disruptive strategies designed to avoid detection.[30] Without co-operation between platforms, an exchange will struggle to enforce

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).

[26] Jackson & Gadinis, *supra* note 19, 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)

[27] 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 & Kanda, *supra* note 26, 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).

[28] *See, for example, sources cited infra* note 13.

[29] Securities and Exchange Commission, *Research Note: Equity Market Volatility on August 24, 2015*, Dec. 2015, 3-4, https://www.sec.gov/marketstructure/research/equity_market_volatility.pdf.

[30] 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).

compliance with securities rules.[31] Where the information and co-ordination costs of enforcement are sufficiently high, exchanges will be selective about enforcement choices, confining interventions to obvious and egregious breaches or those whose impact will be widely felt. Critically, the impact of exchange discipline will be weakened if traders can switch their business to less regulated platforms like dark pools.[32]

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-trodden ground that for-profit exchanges represent somewhat problematic overseers of the market.[33] 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 just their own institution.[34] This core conflict has never been satisfactorily addressed as exchanges have continued to perform their oversight function. Fragmentation, however, imports a particularly pernicious dimension.

With fragmentation, exchanges are internalizing higher costs of oversight while seeing less volume and lower revenues from trading.[35] Facing competition from cheaper, less regulated dark pools, 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. For example, exchanges routinely reward high-volume traders that agree to bring their order flow to the venue.[36] These complex business entanglements raise the cost to an exchange of overseeing and punishing problem 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 wants to avoid a strict exchange, it can

[31] Macey & Kanda, *supra* note 25, 1020-21.

[32] 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).

[33] *See discussion infra* Part I(C).

[34] *See discussion infra* Part I(C).

[35] *See discussion infra* Part I(C).

[36] Exchanges can offer traders incentives to trade on their venue, for example, in the form of "maker taker fees." These fee arrangements are designed such that traders that provide ("make") liquidity for others pay a lower fee to trade on the exchange than those that "take" liquidity. These arrangements seek to encourage passive market makers to transact on the exchange. For discussion and critique of these fee arrangements, Stanislav Dolgopolov, *The Maker-Taker Pricing Model and its Impact on the Securities Market Structure*, 8 VA. L. BUS. REV. 231(2014).

take its business to another platform. The exercise of oversight 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, this Article shows that interconnection between trading venues is not matched by shared incentives to co-operate in overcoming the problems of fragmentation for oversight.[37] High co-ordination and information costs suggest that trading venues should gain by co-operating in the exercise of oversight. By pooling information and sharing monitoring costs through co-operation, venues can mimic the benefits of consolidation in oversight, even while competing in other areas.

But there is little incentive for exchanges and dark pools to co-operate. 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.

Dominant exchanges like the NYSE can no longer consolidate all trading in a security – and reap monopolistic rents from this position.[38] Regulation mandates that securities trade where they are on offer at the best price.[39] 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 deal or some other advantage sought by the investor.[40] By most accounts, this strategy has worked to reduce the various fees that investors pay as a part of trading.[41] It has also resulted in an operationally interconnected market

[37] 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).

[38] 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).

[39] On monopolistic rent seeking, see, for example, the practice of exchanges fixing set brokerage commissions to trade shares, such that brokers charging reduced commissions could be expelled from the exchange. Brokerage commissions to trade 10 shares were the same as those to trade 1000 or 100,00 shares, shielding brokerages and exchanges from competition on fees. For discussion, see, e.g, Jason Zweig, *The Day Wall Street Changed*, WALL ST. J. Apr. 30, 2015. On collusion on the NASDAQ, William G. Christie and Paul H. Schultz, *Why Do NASDAQ Market-makers Avoid Odd-Eighth Quotes*, 49 J. FIN. 1813 (1994) (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).

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

[41] *See e.g.*, Bunge, *supra* note 36.

structure, without which such forum shopping would be impossible.[42] 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. As finance scholars note, this means that markets can be efficient in transmitting information across venues; they can also be quick in spreading error, fraud and the ill-effects of risky oversight from one venue to the next.[43]

Two implications arise out of this competitive, fragmented dynamic. One, venues can privately gain by the exercise of lax oversight. They can attract business to their platform through the promise of lower fees, light monitoring and weak discipline. They can also out-compete other venues by generating sufficient business to spur network benefits that can further lower transaction costs for users. And two, competition between trading venues offers ample motivation to exercise poor oversight because venues in a fragmented market do not internalize the full costs of their failure. Rather, with traders and information moving easily from one venue to the next, lax 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 a more permissive posture 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, exercising robust oversight makes little sense for individual platforms. Venues within a market where risks spread easily from one to the next can still lose even if they take costly 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 risks – and accrue customers – from time to time.

Thirdly, this Article offers a proposal to re-build the quality of exchange oversight in fragmented markets. That exchanges are now deeply diminished in their ability to fulfill their statutory mandate represents a matter of enormous concern for policy – even if relying on private exchanges to police public markets has always been controversial. Ultimately, a failure by exchanges to properly exert market discipline taps into concerns about the viability of markets to function as a secure and

[42] Yesha Yadav, *the Failure of Liability in Modern Markets*, 102 VA. L. REV. 1031, 1090-96 (2016) (analyzing the effectiveness of the liability framework to protect markets from some of the risks of algorithmic trading) (hereinafter, "*Liability*").

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

reliable mechanism to allocate capital. Growing institutional complexity, exemplified by the proliferation of venues for equity trading, necessitates strong private self-regulation to support and backstop public oversight. Where policy is focused simply on reducing front-end investor costs (e.g. lower fees or heightened secrecy) without also tackling deficits in oversight, investors can end up paying, albeit in different ways. As seen in the debacle of August 24, as well as ever-more-numerous instances of exchange failure, investors can lose turbulent, unpredictable markets.[44] Ultimately, markets, as a whole, can suffer deeply where a failure of credibility either causes these investors to discount the value of their risk capital or otherwise to stop investing altogether.

This Article suggests removing the qualified immunity enjoyed by exchanges to make exchanges – and dark pools – more fully liable for costly disruptions arising on account of oversight failure. Building on earlier writings, this Article outlines a design for a new liability regime for exchanges and dark pools. The rationale underlying greater liability for trading venues is straightforward. Liability can better ensure that exchanges and dark pools have a real economic stake in the safe and reliable operation of the marketplace. In so doing, a carefully crafted liability regime can bridge the deficits in oversight created by fragmentation by forcing exchanges (and dark pools) to overcome distorted incentives to under-invest in oversight. A market-wide liability regime, charging exchanges as well as dark pools, for oversight failure seeks to foster some economic inter-dependence to match the operationally interconnected, but fragmented network of competing trading venues. Recognizing that this interconnected market can generate large losses, owing to the quick-fire spread of risks through the system, this Article also outlines a proposal for an industry fund to pay out to investors in the event of a costly fallout. Such a fund should further encourage venues to police each other and take credible steps to share information and coordinate in helping exchanges oversee securities markets more effectively.

This Article proceeds in five Parts. Part I sets out the foundational of exchanges in securities regulation and enforcement. Their significance is underpinned by broader policy objectives of ensuring that capital is efficiently allocated through securities markets. Part II examines the modern turn towards market fragmentation. Part III unravels the implications of market fragmentation for exchange oversight and capital allocation. Part IV proposes ideas for reform. Part V concludes.

[44] Yadav, *Liability*, *supra* note 42, 1070-80; 1090-96. 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.

I. EXCHANGES AND SECURITIES REGULATION

Exchanges constitute the structural backbone of 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.[45] Market design constitutes a central preoccupation of scholars as well as policymakers.[46] This attention is well deserved.[47] Exchanges act as conduits for capital, enabling its transfer from investors to businesses looking to utilize it for growth, making exchanges central players in the national economy.

This Part outlines the role of an exchange in capital allocation and market oversight. It highlights two dueling policy objectives guiding regulation. On the one hand, regulation relies heavily on exchanges to police markets, enforce securities laws and industry norms. On the other, regulatory policy also favors greater competition in the provision of cost-effective trading services. These dueling priorities has resulted in a heavily fragmented network of trading venues, that includes exchanges as well less formal, lightly regulated ATS, colloquially termed "dark pools." With fragmentation forcing exchanges to work harder to compete as well as dividing user volume between multiple venues, this Article raises questions about the ability of exchanges to oversee securities markets.

A. A Market Without Exchanges

Securities markets transfer capital from investors to businesses that can use this wealth for growth. A number of costs make it difficult to realize this goal. First, information is needed to understand and value the

[45] 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).

[46] 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.

[47] *See e.g.*, O'Hara & Ye, *supra* note 10; Madhavan, *supra* note 30 (for a literature survey on some aspects of market design). For a discussion of the literature, Gadinis & Jackson, *supra* note 19. On the international regulation of exchanges, see, Brummer, *supra* note 19.

risks of investments; and secondly, the risks of this capital must be easily transferable to motivate investors to enter the market in the first place.[48]

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.[49] 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.[50] 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.[51] 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.[52]

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 a good moment, transferring the risk to another investor that wishes to assume it and recovering the capital they have left in the 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

[48] 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).

[49] 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).

[50] FRANKLIN ALLEN, RICHARD BREALEY & STEWART MYERS, *supra* note 49, 74-85.

[51] FRANKLIN ALLEN, RICHARD BREALEY & STEWART MYERS, *supra* note 49, 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). By reduction, investors may decrease what they invest or charge a company more for the capital to reflect the perceived riskiness of their investment.

[52] Damodaran, *supra* note 49.

the market because of the high costs of on-selling their risk, businesses that need capital face a shallower pool of investors to access.[53]

Investors that wish to buy or sell securities in the secondary market face a number of expensive logistical hurdles without an exchange in the picture. 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 finding a counterparty, 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.[54]

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 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, there is no guarantee that a buyer will perform. If the buyer can find a better deal elsewhere before the shares and cash change hands, she has an incentive to defect. The possibility of a trader breaching her contract reduces the reliability of the market, warranting additional discounting of capital to reflect this uncertainty.[55] Other risks are also pervasive. Traders need to verify the integrity of their proposed contract party. No one wants to enter into large dollar trades with thieves, liars or cheats or those who do not have the financial resources to go through with the deal.

Search costs and concerns about the riskiness of contract parties point to tensions in a trading system that leaves economic relationships to be regulated informally between two players.[56] Traders might only reveal

[53] Damodaran, *supra* note 51.

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

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

[56] 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*

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.[57] This lack of transparency can also allow room for disruptive 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.[58]

Bilateral economic relationships, then, can prove problematic for capital markets. In an environment where private discipline constitutes the primary means of securing good conduct, the costs of self-protection can create a barrier to entry for 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 generate the information needed to convey a fuller understanding of what public companies are worth.[59] 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.[60] 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.

Markets Privately Regulate Risk? The Development of Derivatives Clearinghouses and Recent Over-the-Counter Innovations, 31 J. MONEY, CREDIT & BANKING 596, 598–606 (1999).

[57] 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.).

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

[59] 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).

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

B. Exchanges and Efficient Market Function

Exchanges institutionalize efforts by securities traders to collectively reduce the information, disciplinary and transaction costs inherent to trading.[61] 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, governance and organizational viability.[62] This helps to reassure investors that companies issuing claims to the public possess the reserves to make good on their promises. Secondly, an exchange brings investors together to trade these listed securities with one another in accordance with agreed rules.[63] Traditionally, by law as well as historical precedent, exchanges have limited entry to firms with demonstrated expertise in matching investors with one another ("brokers") as well as in purchasing securities for their own books ("dealers").[64] 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.[65] Exchanges work by convening a high number of users and generating information for the market in accordance with pre-agreed rules.

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

[61] Pirrong, *supra* note 54, 2-5.

[62] 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).

[63] Karmel, *supra* note 19, 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).

[64] 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 62, 1072-79; Karmel, *supra* note 19, 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.

[65] Macey & Kanda, *supra* note 26, 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).

enable exchanges to reduce fees and to use these lower charges to attract even more traders to the floor, fueling this growth cycle further.[66]

Finance scholars have long recognized the significance of these network effects for anchoring the economic functions of the exchange.[67] 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.[68]

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.[69] Dealers make markets more liquid by offering a ready, reliable counterparty for investors and for smoothing out the vagaries of demand and supply. For these dealers, liquid markets represent a lucrative source of profit. By taking a slice 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 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.[70]

---

[66] 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).

[67] For a summary, Madhavan, *supra* note 30, 23-24.

[68] 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).

[69] Amihud & Mendelsohn, *supra* note 64; Harold Demsetz, *The Cost of Transacting,* 82 Q. J. ECON. 33 (1968) (on the significance of intermediation).

[70] Hendrik Bessembinder, Jia Hao & Michael Lemmon, *Why Designate Market Makers? Affirmative Obligations and Market Quality*, Working Paper (2011). Stanislav Dolgopolov, *Regulating Merchants of Liquidity: Market Making from Crowded Floors to High-Frequency Trading*, U. PA. BUS. L. REV., 19-21.(*forthcoming*); 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.

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. As Professors Gilson and Kraakman observe, markets work most efficiently when they attract a variety of viewpoints and levels of information from expert, informed investors as well as those that may be less uninformed.[71]

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 operate in a market comprised largely of uninformed actors. As Madhavan posits, this dynamic is a positive for the market. It provides an incentive to informed traders to enter, knowing they will win against lesser-informed actors.[72] Dealers too should be more active. They can profit from uninformed traders and will have an incentive to provide liquidity more willingly.[73]

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.[74] 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.[75] Prices can offer investors easily understood,

[71] Gilson & Kraakman, *Mechanisms, supra* note 59; For further discussion, Yadav, *Liability, supra* note 42.

[72] Madhavan, *supra* note 30, 23-24.

[73] 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).

[74] 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).

[75] 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*

low-cost insights into what the market believes a security is worth – its fundamental value. By aggregating the store of public information into an indicator of present worth, the price should include insights about a company's true value.[76] While inexact – as prices only reflect current information – they can still offer an approximate measure of value.[77]

Exchanges that introduce a swath 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.[78]

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."[79] By circulating prices to all traders within their venues, exchanges are able to "produce" a viable market for financial products.[80] The more traders a venue can attract, the greater its significance for price formation in the securities market.[81]

(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).

[76] Goshen & Parchmovksy, *supra* note 48 (describing the essential role of information professionals in price formation and securities regulation).

[77] Gilson & Kraakman, *Information Costs, supra* note 59.

[78] 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). .

[79] 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*, 63 UCLA. L. REV. 968, 992-998 (2016). On the ticker, see sources cited *infra* note 139.

[80] 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 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 26.

[81] 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 80, 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).

C. Why Exchanges Oversee Markets

Given their role in bringing traders together and with 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 oversight.[82] 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 behavior on their own trading venues as well as to assist in the enforcement of securities laws on the books.[83] Section 6 of the Securities and Exchange Act requires an exchange to ensure that its users comply with the exchange's own rules as well as with applicable laws and standards, including those governing fraud and manipulation.[84] 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.[85] Exchanges verify that companies seeking to go public can demonstrate compliance with core SOX provisions in relation to board composition, director independence and oversight committees, before they can list.[86] In this way, regulators harness the importance of exchange services for issuer companies as well as traders – and the high costs of being excluded from them – as a way to produce good behavior.

---

[82] Jackson & Gadinis, *supra* note 19; Macey & Kanda, *supra* note 26.

[83] *See sources cited supra* note 18.

[84] *See sources cited supra* note 18.

[85] 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).

[86] *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.

On paper, exchanges possess strong incentives to exercise high quality oversight. As Professors Mahoney and Pritchard write, exchanges are motivated to craft rules that are robust enough to attract top listed companies, trading firms and market participants.[87] Otherwise, an exchange will fail. Scholars have diverged on exactly how much authority exchanges ought to be accorded, as between public and private regulators in the market.[88] While Professors Mahoney and Pritchard have advocated for greater delegation of authority to exchanges, others like Professors Kahan have urged caution in view of the conflicts of interests discussed below.[89] Scholarly disagreement on the extent and intensity of exchange power is understandable. However, that fact that exchanges develop rules for trading, monitoring and discipline and that they exercise broad oversight 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.[90] In return for playing this public role, exchanges enjoy a qualified legal immunity in the performance of oversight functions.[91]

This section highlights the significance of the regulatory power exchanges have exercised over traders alongside the concurrent, predominant authority of the SEC and other regulators.[92] This section outlines key areas of exchange oversight: (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.[93] 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

[87] Mahoney, *supra* note 26, 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 13 (analyzing exchanges as "sellers" of law).

[88] Jackson & Gadinis, *supra* note 19 (for a survey of approaches in different jurisdictions including the U.S.).

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

[90] *See e.g.*, Mahoney, *supra* note 26, 1459-62; Mulherin, Netter & Overdahl, *supra* note 80, 605-620.

[91] *See sources cited supra* Part (I(B)).

[92] 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.

[93] *See e.g.*, Mahoney, *supra* note 26, 1461-1462.

company to satisfy specific corporate governance and financial conditions and to offer extensive disclosure with respect to earnings, market capitalization, board composition and key personnel.[94] The NYSE wants its future public companies to detail how their organization internally 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 key announcements.[95] 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. For example, if a company faces a rumor such as possible bankruptcy, its stock might crash in price and cause a shock across the market. In such scenarios, an exchange might be expected to take steps to prevent a spiraling crisis on the venue.[96]

For investors giving money to a new public company in the expectation of future returns, such vetting presents an enormous benefit. Rather than make investors review corporate and financial disclosures for conformity with accepted standards, exchanges can do so instead. Moreover, the oversight exercised by the exchange to enforce securities and corporate governance standards can help standardize the internal composition and conduct of public companies. This can make it easier to understand the information that companies produce.[97]

The significance of this scrutiny becomes readily apparent in cases when the exchange 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).[98] But it can also occur involuntarily, such as when a company falls foul of the threshold conditions the exchange sets for listing.[99]

---

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

[95] Exchanges are required by statute to facilitate detection and enforcement of the prohibition against insider trading. See sources cited *supra* note 16.

[96] 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.

[97] 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).

[98] 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).

[99] Macey, O'Hara & Pompilio, *supra* note 97, 689-690.

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.[100] 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 unsuitable for listing.[101]

Empirical studies examining the delisting and exchange disciplinary process for listed companies consistently affirm its financial and expressive importance.[102] 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 and a sharp decrease in trading volume.[103] 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 oversight clearly 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.[104] 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 were paying attention to the signaling value of the exchange's enforcement efforts.[105]

---

[100] *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).

[101] 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.

[102] 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

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

[104] 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).

[105] 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

Policing 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.[106] 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.[107] Under the Securities and Exchange Act, national exchanges have considerable power to discipline members that fail to follow applicable laws and exchange rules, ranging from simple rebukes to outright exclusion from the venue.[108]

This reliance on private exchange oversight makes considerable sense. Exchanges harbor close informational and transactional ties to their traders, with experience and expertise in understanding how traders behave.[109] Moreover, exchanges occupy a front-row seat on the latest action happening on the trading floor.[110] And exchange discipline should have real bite. Punishment by an exchange, encompassing fines, public rebukes, formal warnings and ultimately exclusion carries stigma as well as the real economic cost of traders losing the ability to easily buy and sell

---

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).

[106] *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.

[107] *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/.

[108] §6(b)(7), Securities Exchange Act 1934.

[109] For discussion, Yesha Yadav, *Liability, supra* note 42. 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).

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

securities.[111] Importantly, exchange oversight saves investors – as well as taxpayers – the time, money and effort of performing this task by themselves. Rather than spending a portion of their capital in investigating and disciplining traders or listed companies, investors can rely on exchanges to do this work instead. With expertise, information and disciplinary power, exchanges should be able to do a more efficient job of this task than individual investors. And by relying on exchanges for oversight, investors do not have to discount the capital they put into the market. Public regulators benefit too. By monitoring and enforcing securities rules, exchanges can reduce the resource burden on the public purse and increase the intensity of discipline directed at the market. With exchanges made part of the regulatory apparatus, public authorities can co-opt for-profit private venues into safeguarding trading, rather than leaving them to engage in risky behavior along with the rest of the market.

Indeed, the power of exchange oversight 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.[112]

In May 2010, the CME was again under scrutiny for seeming laxness 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 drop in the Dow Jones Index. The trader was known to the CME because of prior bad dealings. 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 system-wide crisis.[113]

---

[111] *See e.g.*, Mahoney, *supra* note 26.

[112] 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).

[113] 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*

Cases like the collapse of MF Global and the near miss during the *Flash Crash* illustrate the significance as well as the costs of poor exchange oversight. Clearly, exchanges face financial and reputational pressures to provide good policing, 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 maintain the apparatus of surveillance, investigation and discipline.

To be sure, oversight 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.[114] Numerous scholars have remarked on the deeply distorted incentives that for-profit exchanges harbor to be good monitors and disciplinarians.[115] 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 a home to misbehaving traders and thus may think twice before taking action.[116] These concerns are not merely theoretical. 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 regulator.[117] Indeed, the NYSE's own corporate disclosures openly acknowledge the contradiction at the heart of exchange policing between the exchange's costly role as regulator – and its private need to make a profit for its own shareholders.[118]

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.

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

[115] Jackon & Gadinis, *supra* note 19; Karmel, *supra* note 19; Pirrong, *supra* note 54.

[116] Kahan, *supra* note 89, 1517-1559.

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

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

Still, the rationale underpinning this expenditure ultimately rests on ensuring a more efficient environment for capital allocation. In the absence of exchanges exercising oversight, investors must bear the burden of protecting themselves or require public regulators to absorb higher enforcement costs. Facing systematic, duplicative costs, investors will be reluctant to place the full value of their capital at risk. Instead, they will rationally discount what they invest to reflect the expenditure they assume in policing companies and traders.[119] Where such discounts are significant and systematically applied, public companies and capital markets will much the poorer for it.

II. THE MOVE TO FRAGMENTATION IN MARKET STRUCTURE

Theory states that exchanges rely on network benefits to attract increasing trading volume to their venue.[120] Logic would thus suggest 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 greater price efficiency by promoting stronger, more effective oversight.

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 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.[121]

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 different types of trading centers – non-exchange trading facilities that can also match buyers and sellers with one another; and (ii) to require that 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

[119] Damodaran, *supra* note 51.
[120] Madhavan, *supra* note 30.
[121] Madhavan, *supra* note 30. Karmel, *supra* note 19, 164-166.

floor.[122] They must compete. But they are also interconnected through strong informational and transactional linkages that enable investors to pick and choose where to trade.[123]

This Part examines the evolution of market structure from consolidation to its current state of heavy fragmentation.[124] 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 sets the basis for questioning how effectively a fragmented market structure can provide the oversight and discipline envisioned by law and policy.

A. The Rationale for Fragmentation

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 generally go to the NYSE to conclude their deals.[125] This arrangement provided a number of benefits to the listing exchange. For a start, an exchange could count on a steady volume of trades, 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 spikes and crashes in demand and supply.[126] For scholars that consider exchanges as working most effectively when organized as monopolies, this state of affairs promoted a market where trading in securities concentrated naturally in one place.[127]

---

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

[123] O'Hara & Ye, *supra* note 10.

[124] 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.

[125] For example, NYSE Rule 390 restricted the ability of NYSE members to trade in NYSE securities off-exchange. For discussion, Securities and Exchange Commission Equity Market Structure Committee, Memorandum, Rule 611 and Regulation NMS, 2-3 (April 2015); Stephen Diamond & Jennifer Kuan, *Governance Heterogeneity and Performance at US Stock Exchanges: Evidence from Regulation NMS*, Working Paper (Mar. 2012).

[126] Diamond & Kuan, *supra* note 125. 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 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).

[127] Diamond & Kuan, *supra* note 125. Demsetz, *supra* note 26.

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 cartel-like 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.[128] 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.[129]

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, 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 invariably have.[130]

Regulation has sought to find a fix to the problem of high investor costs through the creation of a National Market System.[131] Central to its 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.[132] While much has been written about

[128] 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).

[129] 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).

[130] Diamond & Kuan, *supra* note 125.

[131] 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).

[132] 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

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.[133]

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 its broker permission to avoid the Rule. But it prevents exchanges from requiring that all orders "trade through" the exchange on which the security is listed.[134] In effect, the Rule breaks the once-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.[135]

B. Non-Exchanges in Market Structure

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 – 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 trading venues. Without a few competing venues,

---

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). It is worth noting that SEC Commissioner Piwowar has called for a 10-year review of Reg NMS as part of the Regulatory Flexibility Act, inviting comments on NMS' effectiveness. Rick Archer, *SEC Member Invites Comments On Regulation NMS Review*, LAW 360, Sept. 16, 2016.

[133] 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).

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

[135] 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.

there would be little incentive for dominant exchanges to reduce their prices or to create conditions that offer varied services to investors.[136]

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.[137] 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.[138] 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.[139] Reg ATS permits broker-dealers to enjoy considerable latitude in their ability to establish non-exchange trading mechanisms, expanding investor choice and reducing transaction costs.[140]

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.

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 Investors Exchange (or IEX), made famous by

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

[137] 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.

[138] 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.")

[139] O'Hara & Ye, *supra* note 10 (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).

[140] 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.")

Michael Lewis' *Flash Boys* and operating as an ATS until June 2016 when it gained recognition as an exchange, promises to subject all incoming orders to a 350-microsecond delay. As outlined by the IEX, its platform is designed to reduce the systemic advantages enjoyed by high-frequency traders on national exchanges.[141] 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.[142]

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 its ATS. Regulators found that Barclays had misrepresented the terms on which it ran its ATS. Investors believed that they would not trade on an ATS that also included aggressive high frequency traders. Barclays, however, did apparently allow aggressive HFTs to transact with other investors.[143]

Second, ATS are generally subject to much lower transparency and other regulatory requirements than regular 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 in the national market (in this Article, referred to as a "Common" ATS) does not have to publish its quotes on the Ticker. This 5% threshold is not especially exacting. While an ATS might perhaps end up executing over 5% in any single security, this is not easy. For example, capturing over 5% of all U.S. equity volume on a consolidated basis poses an enormous challenge for any single ATS. Credit Suisse's *Crossfinder* platform saw

[141] The IEX is the latest exchange recognized 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).

[142] 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 75, 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/.

[143] 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.

around 1.88% of all equity trading volume in 2013 when it was ranked as the largest ATS in the market.[144]

Post-trade reporting requirements for such ATS are also subject to delays, albeit short. Broadly, Common ATS send post-trade information to the self-regulatory organization, FINRA, within seven business days at the end of each week.[145] 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.[146] Within the trading day, ATS are also required to send details of concluded trades to FINRA within 10 seconds of execution. ATS represent a paradigm shift from traditional exchanges: pre-trade, these ATS do not have to display their quotes. And post-trade, information appears in the public domain with delays that, while shrinking, are out-of-sync with modern high-speed, microsecond-driven trading practices. Because of this more black-box approach, ATS are colloquially termed "dark pools," venues on which price transparency is limited.[147]

Thirdly, ATS carry far lighter responsibilities for monitoring and discipline. ATS are not mandated to exercise the level of intensity expected of Section 6 exchanges. For one, ATS are heavily circumscribed in their ability to set rules for overseeing their venues. For example, Common ATS are not subject to requirements to establish fair and reasonable access to their venues, as national exchanges must. This can allow ATS to be choosier about who can use their venue. Importantly, ATS can only punish their subscribers by excluding them from the venue, rather than deploying the sliding scale of disciplinary levers common to exchanges. ATS governance can only apply narrowly to their subscribers' conduct on the venue itself – and not more broadly. This means that ATS cannot regulate core institutional features about their subscribers – like how much capital they should keep, employee qualifications, or books and

[144] This is not the case for electronic communication networks or ECNs that expressly post their quotes to the feed. ECNs are ATS whose design is based on posting their current quotes to the market. For discussion, Gary Shorter & Rena S. Miller, *Dark Pools in Equity Trading: Policy Concerns and Recent Developments*, Congressional Research Service, 1-2 (Sept. 2014) *See e.g.*, Ivy Schmerken, *Dark Pools Grab Market Share*, Rosenblatt Report, Feb. 27 2013, http://rblt.com/news_details.aspx?id=228.

[145] 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. It should be noted that Rule 4552 is undergoing amendment, as of Feb 2017, to modify its data collection and reporting requirements, FINRA, SR-FINRA-2013-042, http://www.finra.org/industry/rule-filings/sr-finra-2013-042.

[146] FINRA, TRADING REPORTING FREQUENTLY ASKED QUESTIONS, SECTION 102, http://www.finra.org/industry/trade-reporting-faq#203; FINRA RULE 4552, http://finra.complinet.com/en/display/display.html?rbid=2403&record_id=15496&element_id=11385.

[147] Note that this statement does not apply to electronic communication networks (ECNs) that post their quotes to the consolidated feed.

record keeping.[148] With weaker remit to control the institutional and behavioral conduct of their subscribers, ATS face lower oversight costs.

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 trade shares at the best price anywhere in the National Market. Regulation ATS helps 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?). The Order Protection Rule and the expansion of the market under Regulation ATS have resulted in a fragmented but operationally interconnected 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.[149] 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 channels. Because of the Order Protection Rule, trading centers constantly supply quotes to compete on offering the best price. With many venues available, investors, brokers and market makers must build responsive links to exchanges and ATS in order to route their orders to the exchange or ATS that promises to give their clients the best price or desired services.[150]

C. The Structural Impact of Fragmentation

[148] Regulation ATS—Alternative Trading Systems, 17 C.F.R. § 242.300(a) (2015)

[149] Regulation ATS—Alternative Trading Systems, 17 C.F.R. § 242.300(a) (2)(1)-(2); 242.301(b)(5) (2015); Consolidated Tape Association, Overview, available at, https://www.ctaplan.com/CTA.

[150] *See e.g.*, Markus K. Brunnermeier & Lasse H. Pedersen, *Market Liquidity & Funding Liquidity*, 22 REV. FIN. STUD. 2201, 2202-4(2009) (noting the ability of market makers to transact across multiple venues).

Regulation ATS and the Order Protection Rule have transformed the structure of securities markets. Most obviously, the number of exchanges and exchange-like venues has mushroomed. By some estimates, the market comprises as many as 13 public exchanges and around 30 or so active dark pools.[151]

This proliferation of 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 since the implementation of the Order Protection Rule in 2005, falling from 80% to 34% in just three years.[152] In their study 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.[153] Some estimates suggest that this figure is higher, positing that dark pools now account for almost 40% of equity trading volume.[154] 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 distinguishing feature of ATS lies in their sheer variety. Broadly, ATS can be divided into three categories.[155]

First, some ATS represent communication networks that connect buyers and sellers with each other.[156] 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.[157]

---

[151] Mamudi, *supra* note 10; 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.

[152] Diamond & Kuan, *supra* note 125,

[153] O'Hara & Ye, *supra* note 10, 2-5.

[154] Arash Massoudi & Michael Mackenzie, *Stock Exchanges Seek to Stem the Tide of Dark Trading,* FIN. TIMES, April 25, 2013. It is interesting that on a day of extreme market stress (August 24, 2015), dark pool volume fell, with investors moving to exchanges where they could better ensure they were able to get their desired trades done. Sam Mamudi, *Dark Pools Were the Losers as U.S. Markets Saw Volume Spurt*, BLOOMBERG. Aug. 24, 2015.

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

[156] McCrank, *supra* note 32.

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

Secondly, 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.[158]

Thirdly, 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 pool, whose terms of service (ostensibly) gave investors an opportunity to avoid predatory high frequency traders. The IEX (when it was an ATS) marketed itself as an option where a mandatory time delay equalizes the playing field between HFT and other investors. It is worth noting 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.[159] 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 low transaction costs, would suggest that investors should gravitate towards public exchanges.

This, however, is 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 explanation, as Professor Madhavan posits, is that investors are varied and come to the market with different needs and tolerance for transaction costs.[160]

First, ATS like dark pools offer anonymity to those that wish to trade on them. Regulation ATS does not require Common ATS to publish their pre-trade quotes, and post-trade information is subject to delays. 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 lower levels of transparency.[161]

[158] 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).

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

[160] Madhavan, *supra* note 30.

[161] *See e.g.*, Hatheway, Kwan & Zheng, *supra* note 159.

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, for example, appears compelling 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.[162]

Anonymity can also explain why traders interested in disposing or acquiring large blocks of shares might move towards dark pools. Dark pools can facilitate block trading, for example if traders 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 their impact on the market.[163]

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. ATS have a far lower burden in terms of exercising market oversight. Under Regulation ATS, operators are limited to prescribing rules to cover behavior that takes place just on their specific venue. Further, their disciplinary power lies only in exclusion.[164] Within these parameters, dark pool operators are likely to exercise discipline only when they absolutely have to do so. If the only option available to a dark pool operator is exclusion – losing traders that generate 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 and spreads. 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.[165] And as part of these limited obligations, dark pools do not conform as strictly to

[162] Yadav, *Algorithmic Trading*, *supra* note 75, 151-158.
[163] Hatheway, Kwan & Zheng, *supra* note 159, 4-6.
[164] *See discussion cited supra* Part II(B).
[165] For example, the SEC also is exploring whether to change regulations relating to tick size and pricing to impose a more even regulatory environment. 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).

the usual pricing regulations that normally constrain exchanges.[166] As Professors Masulis, Kwan and McInish note, greater flexibility in relation to certain pricing rules has meaningfully boosted 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.[167]

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 fragmented across around 45 platforms. An emphasis on competition in 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.[168] However, considered more deeply, fragmentations creates a fundamental schism in policy, namely, deep tension with the mandate that exchanges oversee markets and to enforce securities laws and norms against users.

III. THE IMPACT OF FRAGMENTATION ON EXCHANGE OVERSIGHT

This Part examines the impact of fragmentation on the ability of exchanges to oversee markets. Exchanges have long faced skepticism regarding their institutional capacity to perform this role. Scholars have questioned whether for-profit institutions like exchanges can properly perform the public service of policing.[169] Consolidated venues can also

[166] *See e.g.*, Nathaniel Popper, *As Markets Heat Up, Trading Moves into Shadows*, N.Y. TIMES, Mar. 31 2013 (noting that dark pools are generally cheaper).

[167] In particular, dark pools have had more latitude in relation to quoting prices within the penny to offer sub-penny price improvements. On the permissibility of sub-penny price improvements, Securities and Exchange Commission, Division of Market Regulation: Responses to Frequently Asked Questions Concerning Rule 612 (Minimum Pricing Increment) of Regulation NMS, https://www.sec.gov/divisions/marketreg/subpenny612faq.htm; Amy Kwan, Ronald W. Masulis & Thomas H. McInish, *Trading Rules, Competition for Order Flow and Market Fragmentation*, J. FIN. ECON. (*forthcoming*). See also, Robert P. Bartlett III & Justin McCrary, *Dark Trading at the Midpoint: Pricing Rules, Order Flow and Price Discovery*, Working Paper (Feb. 2015) (noting that sub-penny pricing allows queue-jumping by traders that can damage liquidity on public exchanges).

[168] *See e.g.*, Hatheway, Kwan & Zheng, *supra* note 159; Zhu, *supra* note 155. 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 167 (noting the potential for liquidity to be fragmented).

[169] Fleckner & Hopt, supra note 45; Kahan, *supra* note 89; Karmel, *supra* note 19; For a comparison of incentives between mutual, member-owned incentives and for-profit institutions, Pirrong, *supra* note 54.

make mistakes owing to the play of rent-seeking incentives.[170] This Article highlights fragmentation as an entirely new and transformative challenge facing market regulation, arising as a consequence of regulatory efforts to deepen competition among trading venues. This Part argues that exchanges are weakened in their ability to provide robust oversight of markets. It examines the following: (i) diminishing returns of oversight; (ii) challenge of monitoring venues; and (iii) private and collective incentives to reduce investment in oversight.

A. Oversight and Exchange Costs

Oversight is expensive.[171] Regulators 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.[172]

Statute places express responsibility on exchanges to monitor and discipline those that utilize the exchange for listing and trading. This task of private policing is – and should be – resource intensive for an exchange seeking to perform it effectively. For a start, exchanges need to invest in building the systems necessary for detailed monitoring and surveillance of users. Commentators have highlighted the rising costs of this task, fuelled by exponential growth in technology and the data-intensity of modern, automated markets.[173] 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

[170] 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.

[171] 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.).

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

[173] 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).

market by 137% to reach 141,919 messages-per-second in 2011, a figure set to grow exponentially annually. This increase was driven by commercial need as much as regulatory demand, essential to keep the market updated and to process information about trading activity.[174]

In addition to surveillance, exchanges must also invest in enforcing discipline. This is a tricky task. As scholars remark, 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 traders and listed companies for their business, it is easy to see why exchanges might see serious 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 this conflict. For one, they have established separate legal entities – distinct from the exchange itself – to carry out the actual business of punishing violations. Notably, the NYSE has established NYSE Regulation, a not-for-profit subsidiary of the NYSE that is charged with leading the exchange's enforcement efforts.[175] In addition, exchanges have outsourced – to varying degrees – their oversight responsibilities to the Financial Industry Regulatory Association (FINRA), the self-regulatory organization for broker-dealers. Instead of enforcing breaches themselves, exchanges can delegate an allocation of this task to FINRA.[176] The solution is far from perfect – particularly as some observers have noted shortcomings in FINRA's enforcement intensity.[177] However, it offers a mechanism to blunt, in part, the perceived conflict of interests embedded in the notion of exchange oversight.

Fragmentation further diminishes the incentives of exchanges to invest in oversight. First, fragmentation raises the per-trade costs of policing, reducing the financial motivation to perform this task effectively.

Historically, exchanges have been well placed to recoup the costs of monitoring and discipline on account of consolidation. They hosted public listings as well as dominated secondary trading in listed securities. With exchanges guaranteed to see listing fees, trading volume, as well as reputational capital, investment in oversight made sense. Exchanges could privately reap the benefits of oversight. If they performed well, then they

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

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

[176] 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.

[177] 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).

could enjoy the externalities of a job well done. Listed companies would be sounder economic prospects and traders better behaved, attracting more investors and public companies to the venue.[178] With real skin-in-the-game, exchange had incentives to invest in monitoring and policing, thickening alignment between private and public interests.

These advantages break down in a fragmented market. Exchanges see diminished volumes of traders on their venue, lowering fees and trading business. Both the NYSE and the NASDAQ have witnessed sharp reductions in their 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.[179]

Lower market share poses a problem for exchanges. 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 thus limited. In short, the full oversight 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 to obtain information from other venues and to coordinate in monitoring and discipline. 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, their decision-making increases the information costs that exchanges bear in monitoring traffic through 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 and taking their business to multiple platforms. Patchy information on a shifting set of traders can make it harder for exchanges to establish patterns of bad behavior. To the extent that exchanges see steadily lower volumes and reduced revenues from trading, the motivation to spend on such analysis grows less compelling.

Secondly, within a fragmented market, exchanges do not internalize the full benefits of their investment in oversight. Rather,

[178] Mahoney, *supra* note 26; Pritchard, *supra* note 87.

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

competitors reap these gains. That is, other exchanges and dark pools can free ride off the efforts of a diligent exchange.

Competitively, exchanges must absorb the lion's share of the costs of oversight. Recall, that ATS face fairly light obligations when it comes to policing. ATS set rules to regulate the behavior of traders on their venue – and nothing more and can only really discipline by excluding users.[180] Moreover, ATS can rely on exchanges to police traders and save themselves time and money in the process.

This uneven distribution of oversight costs as between exchanges and ATS might appear reasonable at first sight. Theory suggests that exchanges should see more volume 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 breaks down in practice. While individual dark pools may try to keep within the 5% limit, exchange volumes too routinely fall below or trade around this limit.[181] 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 cheaper dark pools.

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 oversight. Exchanges must discipline the very traders and companies that represent their source of revenue, market share and reputation. As for-profit institutions, exchanges face a deep tension in satisfying both their private accountability to their own shareholders and their public accountability to the market.[182]

The pressure created by increased competition and lower revenues from trading can motivate exchanges to seek out other sources of profit. Numerous examples showcase attempts by exchanges to bridge closer financial ties between themselves and their users. 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

[180] *See discussion supra* Part II(B) and (C).
[181] Stafford, *supra* note 179.
[182] *See e.g.,* Kahan*, supra* note 89; Karmel, *supra* note 19; Pirrong, *supra* note 54; For comparative discussion, Jackson & Gadinis, *supra* note 19.

opportunities by providing this liquidity for others and can charge a fee from one that "takes" them.

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).[183] 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 to trade, the more money the exchange can stand to make.[184]

Colloquially termed "maker-taker" fees, these arrangements have attracted considerable attention from scholars and policymakers for their impact on market quality.[185] 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 traders.[186] 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 volume moves elsewhere.

Beyond this fee structure, exchanges also offer a suite of services that now constitute lucrative sources of revenue. Exchanges sell data packages, promising more detail and faster information streams than what

[183] This illustration is entirely stylized for ease of describing the phenomenon. For one, Rule 610 of Regulation NMS caps access fees at 3/10th of a cent per share for stocks with prices of $1 or more. It should be noted that ATS such as electronic communication networks also provide maker-taker fees. For insightful discussion, Dolgopolov, *infra* note 36, 244-245.

[184] 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).

[185] *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).

[186] Dolgopolov, *supra* note 36, 244-248 (on best execution duty to investors).

is publically available.[187] They sell real estate that secures physical proximity for users to exchange servers, facilitating speedier trading between the exchange and trader.[188] Tellingly, exchanges even offer advisory services to users designed to help them comply with obligations under exchange rules and corporate governance.[189]

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.[190]

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 are likely to 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.

B. Information Gaps and Co-ordination Failure

This Article highlights the uneven allocation of regulatory responsibility between exchanges and dark pools. Exchanges are subject to expansive delegation of regulatory responsibility under the Exchange Act. Dark pools, however, face a far lighter burden. Transparency rules, too, diverge sharply. Whereas exchanges are continually posting quotes and updating prices, dark pools can operate as black boxes. This asymmetry

[187] *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.

[188] *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 77.

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

[190] Stafford, *supra* note 179; Larry Tabb, *Stock Exchanges are Eating Your Returns*, BLOOMBERG, Jan. 22, 2016.

raises serious concerns for exchange oversight. Fragmented markets mean that exchanges face high costs in monitoring activity on other trading platforms. Without this information, however, exchanges cannot fully determine the risks on their own venue and in the market as a whole.

The National Market System aspires to be an essentially singular economic space for trading securities.[191] Through the Order Protection Rule, the System works to generate a single best price for the market. To make this happen, trading venues are connected to each other through strong informational as well as operational links.[192] 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 faces a conceptual problem: traders can move easily across the system. Exchanges, however, can only really monitor activity on their own venues effectively. This leaves exchanges facing blind-spots. Though Section 6 may envision a handful of exchanges safeguarding the securities market, fragmentation leaves exchanges incapable of doing so logistically, as more trading migrates to dark pools. With dark pools subject to much lighter regulatory requirements, exchanges face risks emanating from potentially riskier, less monitored and less transparent areas of the market.

These blind spots mean that exchanges face (impossibly) high information and coordination costs in oversight. These make it much harder for exchanges to detect misconduct and enforce securities rules. For instance, exchanges must prevent fraudulent and manipulative behavior. Fulfilling this statutory mandate is very difficult where traders can transact across a variety of venues with different degrees of regulation and transparency. A fraudster may more successfully escape detection by trading through a dark pool. If she wishes to trade, she can buy or sell her tainted shares on a dark pool with limited transparency.[193] If this fraudster also trades on an exchange, there are few easy, low-cost ways for the exchange to find out about her bad activities on the dark pool and to discipline her. Similarly, a trader intent on manipulation may strategically engage in a kind of "supervisory arbitrage" between lit, transparent exchanges and opaque dark pools. 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

[191] 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.").

[192] Gerig, *supra* note 43.

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

price. Following this, she can go to a dark pool and purchase Public Company shares at the artificially depressed price without necessarily alerting the exchange or other traders.[194] 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, she 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 have two possible options to monitor the market, despite fragmentation. First, they might monitor other exchanges and dark pools to overcome information deficits. Exchanges might seek out information from other venues on traders, carefully scrutinize post-trade prices, or observe unusual trading on their own platforms that might connect with information from other venues.

Though appealing, this option is likely too time and resource expensive to be feasible. Exchanges must investigate any number of dark pools and other exchanges. The costs of investigations will be high. Exchanges would have to police an enormous volume of trading outside of their own venue. With information limited as a result of a lack of pre-trade and post-trade transparency at dark pools, these investigation costs will likely be too high for any one exchange to wish to internalize privately.[195]

Exchanges could also police individual traders more diligently. Such intensive oversight would rest on the assumption that exchanges and dark pools are home to a common population of traders 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. By forcing traders to behave better on their exchange, exchanges can ensure that the market generally becomes a place for safer traders.

Even here, the solution breaks down. Emerging studies suggest that the investor populations of dark pools versus lit exchanges often diverge. Even though informed traders can 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

[194] 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).

[195] 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.

trading in a dark pool. If they are all informed about Public Company's real value, they may all trade similarly and in one direction. This group thus need a variety of traders including uninformed traders against which they can make money.[196] 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.[197]

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 public exchanges can end up *more* informed, because savvy investors are drawn to exchanges owing to the availability of more reliable execution. Relatedly, finance theory suggests that market makers will move to venues with a higher population of uninformed investors in order to make money. Dark pools, should therefore be attractive to market makers that benefit by trading against more uninformed traders.[198]

This leaves exchanges in a difficult position in their effort to monitor traders. The population of traders may not always be constant or 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). It cannot just be assumed that exchanges will see a steady and common pool of traders that can be scrutinized and whose activities can be controlled effectively.

Furthermore, even if discipline is exercised by an exchange against a Trader – for example, if an exchange demands that a Trader keep more capital – this discipline may be insufficiently demanding to reflect the risk the Trader takes. Without fully knowing what traders are doing on other venues, exchanges 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 and the exchange. If the

[196] 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).

[197] Glosten & Milgrom, *supra* note 27 (noting that dealers transact as uninformed traders).

[198] 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).

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. 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. Distorted Incentives towards Oversight

Regulation splits oversight responsibilities unevenly between exchanges and dark pools. Exchanges are subject to Section 6 of the Exchange Act; dark pools are not. This asymmetry places a relatively higher compliance cost on exchanges. Because exchanges are subject to this mandate, they should be motivated to contact other exchanges and dark pools and to cooperate in the exercise of oversight.

However, this is not necessarily the case. In the National Market, interconnected venues compete for business, such that venues can gain from taking risks for private gain because the fuller costs of this risk-taking are borne by and shared between other venues. Venues stand to benefit by investing minimum resources in oversight, as the costs of failure can be externalized to the system of exchanges and dark pools.

For a start, exchanges have little incentive to exceed a minimum level of investment, not going beyond what is sufficient to police users on their own venues. Investing to bridge the gaps in oversight left by other venues is wasteful from the perspective of their own profits. By going beyond what the exchange needs to do to keep its own venue safe, it confers value on its competitors. Other venues enjoy the benefit of safer traders and can attract business by the promise of cheaper services. Externalizing such benefits to other venues is harmful to an exchange. Not only does it allow a competitor venue to free ride on the exchange's efforts, but it can also encourage a competitor to exercise less than optimal oversight on its own venue. A competitor venue – relying on an exchange to do the hard work – has every incentive to under-invest in monitoring. Exchanges can thus be wary of allocating excess resources to general oversight. Doing so risks enriching competitors and encourages these competitors to take more risks, knowing that hard-working exchanges are picking up the tab.

But do exchanges have incentives 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 regulator.[199] 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 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 dark pools 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 venues, bringing high-speed efficiency to markets – but also enormous vulnerability to errors moving rapidly from one platform to another.[200] Put simply, this means that errors on an exchange or dark pool can spread to other venues, creating costs that can quickly move beyond the confines of a single trading platform.[201]

If an exchange does not internalize the full consequences of its risk taking, it can have fewer incentives to invest in overseeing problem behavior on its own 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 deciding how much to invest 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 does not internalize the full cost of risk-taking as costs are also borne by other venues. And risks from other venues can migrate to the exchange despite the exchange's 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.

---

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

[200] Gerig, *supra* note 43.

[201] Bob Pisani, *supra* note 4. 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).

Option 2: This option is problematic for an exchange. While it seems appealing for an exchange to just focus on protecting its own venue, implementing this goal is harder than it sounds. 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 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. It means investing time and money where the gains are uncertain (and potentially reaped by others).

Option 3: This option benefits exchanges charged to perform expensive oversight. Indeed, it represents a rational allocation of an exchange's regulatory resources. Exchanges that invest even in minimal oversight of their own venue can confer a benefit to a competing exchange. Robust oversight benefits others and undermines an exchange's profitability. Underinvestment in discipline is more rational. For one, lax oversight boosts profitability. It reduces the transaction costs a venue faces. It can also encourage volume to come to an exchange.

Fragmented markets can encourage greater risk-taking by an exchange because it does not fully internalize the costs of its own bad oversight. Risks spread fluidly. 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 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 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.[202] Dependence on such traders for liquidity 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 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 oversight.

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 by itself. Even with transparency, interconnection between venues can result in harms that may grow in seriousness as they proliferate across the different venues. This interdependence and vulnerability to unpredictable risks can encourage a sub-optimally lax approach to oversight. If they know they can get in trouble because of someone else's bad oversight – and pay out for someone else's mistakes – it makes sense for exchanges to also take profitable risks that might impose some external costs. Otherwise, careful exchanges are simply absorbing the costs of others, without any real pay-off for themselves. Diligent exchanges face a doubly bad outcome. For one, they are left holding the can, as other venues take risks, make 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 fragmentation, venues collectively face two broad choices: (i) to agree to invest heavily in oversight as a means of protecting themselves and each other; or (ii) to take risks,

[202] Massoudi & Mackenzie, *supra* note 154 (noting the rise of order types and rebates designed to capture business from dark pools). It is worth noting that ATSs too can offer a range of order types to help ATSs to compete and attract traders. For discussion, Stanislav Dolgopolov, *High-Frequency Trading, Order Types, and the Evolution of the Securities Market Structure: One Whistleblower's Consequences for Securities Regulation*, U. ILL. J. L. TECH. & POL. 145, 148-49 (2014).

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, 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 is also concerning. As the August 24 market crash and the *Flash Crash* show, venues are subject to disruptive risks, impacting not just trading but also the credibility of the system as a whole.

In summary, fragmentation in market design diminishes the capacity of exchanges to exercise effective oversight. This Article 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 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 oversight, pervasive informational gaps should constitute a major source of concern. 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 policing 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 oversight, garnering high private gains but shifting the fuller costs of their indiscipline to others in the market.

IV. THE CASE FOR LIABILITY IN MARKET DESIGN

The failure of exchange oversight and the private self-regulation it represents creates systematic costs for the efficient allocation of capital. If exchanges cannot 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 achieving this statutory mandate close to impossible practically

This Part outlines proposals to cure this deficit. As a starting point, I examine the workability of returning markets to a more consolidated structure comprising just a small handful of venues, and suggest that this solution is unlikely to be successful.

In the absence of consolidation, this Part advocates for expanding liability for exchanges and dark pools and holding them more directly liable for their failures in oversight. This means removing the cover of qualified immunity for exchanges that has allowed them to have wide latitude in the quality of oversight they have provided. The goal of this proposal, one that builds on my earlier writings, seeks to force exchanges (and dark pools) to focus more explicitly on their responsibilities as market monitors. My earlier writings sought to hold trading venues more fully liable for disruptions arising on account of automated trading practices. I build on earlier work by suggesting that the likelihood of error and disruption is amplified by ineffective oversight in fragmented markets. Stronger liability can help offset the negative incentives afflicting venues to be lax in monitoring and enforcement. Finally, building on prior work, this Article re-emphasizes the benefits of exchanges and dark pools contributing to a shared fund to pay out on liability claims when a single exchanges or dark pool cannot. In building mutual contribution to a compensatory fund, the proposal encourages peer monitoring between venues to hold each other accountable for their failings in oversight.[203]

A. A Return to Consolidation?

The costs of fragmentation might suggest that policy has got things badly wrong in the last two decades. Fragmentation erodes the major structural advantages that exchanges possess when exercising oversight, like network externalities and deep informational reserves on traders. A proliferation of dark pools – permitted to transact without the usual compliance burdens that exchanges face – siphons off both high volumes of traders as well as information on them. The threat of exclusion is also rendered much less powerful.[204] Exchanges are forced to work harder on a

[203] This Part builds on my writings in Yadav, *Liability*, *supra* note 42. *Liability* proposes stronger liability levers for exchanges in the context of risks 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.

[204] *See e.g.*, Kwan, Masulis & McInish, *supra* note 167.

tighter budget to fill these gaps, leaving investors exposed to higher risks if exchanges' for-profit motivations take precedence over the public good.

At first blush, this predicament points to the benefits of pivoting back to the tried-and-tested model of consolidating trading venues into a handful of institutions. Regulation ATS permits a plethora of non-exchange trading venues to thrive on account of lower entry and operating standards. From the structural standpoint, then, one response points to the need to re-think Regulation 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. ATS are unlikely to withstand the twin challenges of acquiring trading volume and ensuring that users get cheap, high-quality services at the same time. In a higher compliance environment, ATS may struggle to develop the networks necessary to sustain trading volume and the quality of services provision to influence trader preferences.

To be sure, regulators have outlined possible reforms to tighten 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 demanded. Whereas previously, ATS 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.[205] 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 failed to deliver.[206]

But, these reforms do not challenge the fundamental notion of off-exchange trading and the essential place of ATS as venues designed to facilitate competition. Also, 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 as a competitor to traditional exchanges, the SEC's proposed regulation does not look likely to change this state of affairs in practice.

In many ways, a return to 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 problem of sub-optimal exchange

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

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

oversight – 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.[207] 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.[208] In looking to curb use of ATS, policy must first determine whether preserving investor choice in market design remains a goal worth pursuing. A few issues are worth considering. First, one might question whether investors will accept a 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 oversight, it clearly holds appeal for investors, driving volume and continuing interest in dark pools. Besides the offer of opacity, dark pools can also be cheaper, promising lower fees 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.[209]

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

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

[208] O'Hara & Ye, *supra* note 10 (for a literature review); Madhavan, *supra* note 30. 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 80.

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

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.[210] Dark pools can also help institutions dispose of large blocks of shares without disrupting markets or immediately disclosing investor intent.[211] At the same time, others express reserve, pointing out, for example, that excessive fragmentation in markets can damage liquidity on lit exchanges.[212] In all, firm assessments of the merits of dark pools vs. exchanges are 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 dark pools provide for market quality. Combined with path dependencies generated over the two decades during which investors have enjoyed greater choice, a dramatic about-turn towards consolidation starts to look unfeasible.

B. A Case for Liability

Short of structural consolidation, trading venues can be pushed towards better oversight by a stronger threat of legal liability and a collective liability between exchanges and dark pools for market-wide harms. Historically, exchanges have enjoyed wide immunity from liability in the performance of their regulatory functions – a qualified immunity in return for performing the public good of policing.[213]

The critical importance of exchanges, however, means that their failings can carry high financial and expressive consequence. A systematic degree of error, misinformation and fraud can impact the value of securities and leave investors and public companies to bear the costs of an exchange's poor oversight – hurting capital allocation. Investors-at-large

[210] *See e.g.*, Zhu, *supra* note 155.

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

[212] Kwan, Masulis, McInish, *supra* note 167, 6-7 (discussing mixed conclusions).

[213] 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).

and public companies are generally inefficient monitors and cannot be relied on to internalize the costs of exchanges falling short in their statutory oversight duty. Moreover, statute is clear in giving exchanges an expansive role in oversight. While consolidated exchanges might have had advantages, fragmentation does not absolve them of this role. However, fragmentation does raise structural challenges to the exercise of oversight. In the absence of consolidation, it follows that the application of the statutory mandate must now adapt to the reality of fragmented markets.

Liability for Trading Venues: This Article shows that oversight is undermined in three key ways: (i) exchanges carry the main weight of liability relative to dark pools, but see an ever-diminishing fraction of trading volume. With less money and fewer traders, oversight is 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 dark pools 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.

Risk sharing between exchanges and ATS points to the desirability of imposing liability for oversight failures on both dark pools as well as on exchanges.[214] This necessitates grounding this liability within the context of a broader duty to police markets, applying not only to exchanges but also to dark pools. While dark pools might continue to benefit from regulatory leeway (e.g. in the lack of transparency), enlarging the scope of the oversight mandate to cover dark pools as well as exchanges makes sense from the policy standpoint. Dark pools host traders in the same National Market securities as exchanges. Moreover, risks can spread from dark pools to exchanges (and vice versa) given common informational and logistical connections. A marked asymmetry in the policing burden carried by exchanges and dark pools thus appears formalistic. Just as exchanges are required to ensure that they assure compliance with securities laws and prevent fraud and manipulation, similar requirements ought to be expressly extended to dark pools. Regulators have proposed measures requiring dark pools to disclose more about detail about their operations. It seems fitting to also deepen their role in oversight as a means of ensuring that dark pools pre-commit to a basic standard of organizational form, leaving venues free to compete on other services. This might mean, for example, that dark pools also ensure compliance with securities laws, particularly as these relate to fraud, manipulation and insider trading. Given the lack of

[214] Yadav, *Liability*, *supra* note 42.

transparency on dark pools, an explicit assumption of legal duty to prevent misbehavior and misconduct can offset the risks of traders utilizing dark pools for supervisory arbitrage and deceptive behavior. In addition, dark pools might vet those that utilize their venue more strictly. Differing entry standards between dark pools and exchanges encourage less qualified traders to utilize dark pools for potentially risky trading. If dark pools 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 dark pools.

Rather than giving trading venues latitude and immunity, as the law has done the risks from competing venues point towards the benefits of imposing liability in case of oversight failures by trading platforms. The scope of this liability is set to be deliberately broad. In past work, I have suggested that exchanges be held secondarily liable, on a liability basis, for instances of error, negligence or fraud occurring in automated markets, where the trader causing this harm is unable to cover the losses. In other words, exchanges stand ready to cover the 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 fallen short in their exercise of their oversight functions and caused losses for investors in the market.

First, an *ex post* compensation mechanism aims to foster better *ex ante* incentives for exchanges and dark pools to be rigorous in oversight. Venues may be to blame in cases where traders cause large losses. When traders make costly mistakes – so large that they cannot pay for it themselves – exchange/dark pool oversight failures are likely to blame. 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? Why did monitoring mechanisms fail to detect instances of egregious trader misbehavior? To the extent that exchanges and dark pools have their own pocketbooks on the line, one might expect them to attack instances of misbehavior more forcefully *ex ante*.

But exchanges may be separately liable for sub-optimal oversight of markets – unconnected to harm caused by traders. This might happen, for example, if exchanges 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 dark pools should be seen to have, and actually have, a tangible stake in market oversight. This should improve market monitoring 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 exchanges and dark pools to take profitable risks at the expense of the market system. Venues may be willing to overlook instances of misbehavior on their platforms to attract volume, lowering transaction costs for themselves and building a profitable user base. In this context, the threat of liability for a dark pools and exchange can provide a corrective to these distorted incentives. By imposing costs on any motivation to riskily oversee the market, liability levers 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 pay out.[215] 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 dark pools and then mushroom across several venues, leading to a large claim. If the liability regime underlying market structure lacks resources, it lacks the credibility to constrain bad actors or to assure investors about the protective potential of exchange oversight. In seeking to encourage better collective monitoring and oversight, such a Fund ought to include contributions by dark pools and exchanges.

This Fund can support losses caused by failures of oversight by exchanges and dark pools. The design would fulfill three key criteria: (i) to compensate investors that lose on account of a failure by an exchange or dark pools to meet its oversight responsibilities; (ii) to reduce bad incentives on the part of exchanges or dark pools to take risks knowing that the Fund is available to pay out on a claim; and (iii) to force exchanges and dark pools to actively monitor each other as a means of private discipline.

With respect to (i) and (ii) above, a Fund might require that all venues 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, past record of good oversight). In the event of a covered loss, the Fund can pay out to an aggrieved investor or other party, first dipping into the reserves of any trader that is misbehaving and then the main venue where the bad trader was active before then using up contributions by other venues. If one or more venues are implicated, the Fund can assess joint liability for more than one venue.

[215] Yadav, *Liability*, *supra* note 42.

Importantly, to reduce moral hazard on the part of venues, caused because venues gain the support of an industry wide disruption fund, payments will first be made by the most culpable venue. 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 dark pools cannot easily verify that others are conducting oversight effectively. A shared liability fund can motivate exchanges and dark pools to better oversee each other's conduct. An industry fund should also provide an institutional locus of common interests. It can push venues to co-operate in the exercise of market oversight, to share information and pool monitoring resources. Underlying this motivation 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 oversight as a central pillar of the regulation.

V. CONCLUSION

Regulation relies on exchanges to oversee securities markets. But recent years have witnessed a transformation in market structure. Instead of relying on a handful of traditional exchanges, regulation has ushered in deep fragmentation in market design, resulting in a proliferation of exchanges as well as lightly regulated trading venues. While fragmentation has brought benefits, such as lower fees, it has also made it near impossible, in practice, for exchanges to exercise oversight across the

marketplace. Lower trading revenues, fierce competition and incentives to take profitable risks have placed exchanges on the back foot in their ability to police an innovative and constantly evolving market. In responding to the question whether today's fragmented markets are effectively governed, I have argued that major deficits exist that undermine the function of U.S. securities markets. This Article takes a first step to restore the efficacy of exchange oversight. So long as statute continues to mandate the significance of exchanges as market monitors, ensuring that they can practically perform this task should constitute a policy imperative. So far, regulatory policy has focused primarily on making exchange services more competitive for investors, without examining the effect of this emphasis on their capacity to monitor. Even if markets see gains from the perspective of cost effectiveness, efficiency and liquidity, this Article suggests that these benefits are limited if market oversight falls short.