

The SEC as Financial Stability Regulator

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It is well established that the Securities and Exchange Commission (SEC) has a mandate to protect investors and to encourage capital formation, but this Article argues that the SEC also has another mandate—to promote financial stability. Importantly, this does not mean that the SEC needs to abandon its traditional identity, or adopt the regulatory tools and methods deployed by prudential regulators like the Federal Reserve. Instead, this Article argues that the SEC is best suited to promoting the stability of the financial system from a market, rather than a prudential, perspective.

To make this Article's discussion of "SEC as financial stability regulator" more concrete, it looks in detail at the SEC's approach to high frequency trading—a practice that is fundamentally changing the structure of the equity markets the SEC oversees. In particular, this Article analyzes all of the testimony, public statements, and speeches by SEC commissioners and senior staff members on the subject of high frequency trading that were published between January 2010 and January 2017. From a close reading of these communications, this Article establishes that during this period, financial stability was indeed a motivating concern of many SEC Commissioners and staff members as they explored regulatory reform of high frequency trading, and equity market structure reform more generally. This Article therefore concludes by exploring what a financial stability-minded approach to regulating high frequency trading would look like (and the types of resources the SEC would need to discharge such a task).

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*Associate Professor, Suffolk University Law School. Thanks go to Charles Klingman, Don Langevoort, Jeremy McClane, Andrew Tuch and Yesha Yadav for their helpful comments on earlier drafts, as well as to participants at the Bay Area Corporate and Financial Scholars Workshop at Stanford University and the National Business Law Scholars Conference at the University of Utah. Marissa Louro provided excellent research assistance.

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I. INTRODUCTION

After the financial crisis of 2007–2008 (the Crisis), regulators around the world adopted the pursuit of “financial stability” as one of the foremost goals of financial regulation.¹ However, the ubiquity of the goal belied a lack of consensus about how regulators should approach financial stability, and that lack of consensus persists today. This Article takes an expansive view of financial stability regulation, arguing that such regulation should seek to prevent disruptions to both financial institutions and markets, if such disruptions would have negative consequences for the broader economy. Because the Securities and Exchange Commission (SEC) has much more experience with the securities markets than other US financial regulators, the SEC is the agency best positioned to ensure the robustness of those markets. The SEC can therefore make a significant contribution as a market-oriented financial stability regulator—even if other forms of financial stability regulation might be best left to prudential regulators like the Federal Reserve.

Private participants in the securities markets have neither the incentives nor the ability to promote financial stability (a collective good),² and so only a government body can work to ensure that the securities markets are robust to shocks, and minimize the likelihood of shocks occurring in the first place. If the SEC fails to take on this role, we cannot expect any other government agency to fill the lacuna. While the Financial Stability Oversight Council (FSOC) was created to address threats to the stability of the financial system, it is, at its core, a committee that is designed to leverage the expertise of its member agencies rather than performing extensive regulatory functions itself. Other than the SEC, there is no regulatory agency represented on the FSOC that has extensive experience with the securities markets.³ And there are certainly developments in the securities markets that raise financial stability concerns—this Article will focus in particular on the increasing prevalence of high frequency trading (HFT) in the equity markets.

HFT is an umbrella term for a variety of different automated trading strategies; their common characteristic is that the computer algorithms that make the trading decisions are designed to hold assets for only a very short period of time. HFT now accounts for more than half of all trading in the U.S. equity markets,⁴ and while the practice certainly affords benefits in terms of reducing the time and cost of executing trades, it also increases the complexity, interconnectedness and opacity of the equities markets.⁵ Events such as the

1. Hilary J. Allen, *What is “Financial Stability?”: The Need for Some Common Language in International Financial Regulation*, 45 GEO. J. INT’L L. 929, 930 (2014) [hereinafter Allen, *What is Financial Stability*].

2. Hilary J. Allen, *Putting the “Financial Stability” In Financial Stability Oversight Council*, 76 OHIO ST. L.J. 1087, 1103 (2015) [hereinafter Allen, *FSOC*].

3. *Id.* at 1091. The Chair of the SEC is a member of the FSOC, although admittedly, he or she is not compelled to represent the consensus view of the other Commissioners in FSOC deliberations—at times, then, the FSOC’s deliberations may reflect the personal views and securities expertise of the Chair, rather than the SEC as an administrative body. *Id.* at 1118.

4. Austin Gerig, *High-Frequency Trading Synchronizes Prices in Financial Markets* 1, (Div. Econ. & Risk Analysis, SEC, Working Paper, 2015), <http://www.sec.gov/dera/staff-papers/working-papers/dera-wp-hft-synchronizes.pdf>.

5. See *infra* Part V.

“Flash Crash” in May 2010 have alerted regulators to HFT’s potential to both generate and transmit shocks through the financial system: the potential threats that HFT poses to financial stability (as well as to investors and capital formation) will be explored in detail in this Article. Of course, high frequency traders do not trade exclusively in the equity markets (i.e. the secondary trading markets for listed stocks);⁶ there is an almost limitless list of assets that HFT firms will trade, including a multitude of derivatives instruments. However, this Article will focus on the equity markets.

The SEC is currently considering how to reform its regulation of the equity markets in light of the rise of HFT and other developments, a project that began in earnest with the issuance of a “Concept Release on Equity Market Structure” on January 14, 2010 (the Concept Release).⁷ Although some reforms have been implemented since that time, the project of market structure reform is nowhere near complete. To the extent that the SEC is planning to promulgate further rules addressing HFT and the equity market structure more generally, such rules can be said to be in the “preproposal period” (i.e. the time prior to the proposal of any rule in the Federal Register). As Krawiec notes, the preproposal period is “a time period about which little is known, despite its importance to policy outcomes . . . the need to produce a proposed rule that is ready for comment pushes much regulatory work to this early stage of the rule development process.”⁸ This Article seeks to provide some insight into the preproposal stage of the market structure reform project by considering the testimony, public statements, speeches, and press releases that have been disseminated on the subject of HFT by the SEC, its Commissioners, and its staff.⁹

The author reviewed and manually coded 107 such documents, all published between January 2010 and January 2017. A close reading of these speeches, public statements, press releases, and testimony revealed that the stability of the equity markets was indeed an important goal for many of those who held key SEC positions between 2010 and 2017.¹⁰ Unfortunately, there is no unambiguous legislative directive for the SEC to pursue financial stability as a regulatory objective,¹¹ and it is therefore quite plausible that under the Trump administration, the SEC might abandon the concern for market stability that was expressed

6. Concept Release on Equity Market Structure, 75 Fed. Reg. 3594 (Jan. 21, 2010) (codified at 17 C.F.R. pt. 242). The SEC does not see this market as including “other types of instruments that are related to equities, such as options and OTC derivatives.” *Id.* at 3602–03.

7. Concept Release on Equity Market Structure, 75 Fed. Reg. at 3594. Former SEC Chair Mary Schapiro described market structure as encompassing:

all aspects of the organization of a market, including the number and types of venues that trade a financial product and the rules by which they operate. Although these issues can be complex and the rules technical, a fair, orderly and efficient market structure is the backbone of the equity markets and has significant implications for our financial system more broadly. *Monitoring Systemic Risk and Promoting Financial Stability: Hearing before the S. Comm. on Banking, Hous., and Urban Affairs*, 112th Cong. (2011) (statement of Mary L. Schapiro, Chairman, SEC).

8. Kimberly D. Krawiec, *Don’t “Screw Joe the Plummer”: The Sausage-Making of Financial Reform*, 55 ARIZ. L. REV. 53, 70–71 (2013).

9. Because this Article’s goal is to elucidate the SEC’s attitude towards regulating HFT and dark pools, it does not consider public comments that have been submitted to the SEC in response to the Concept Release on market structure reform, or in response to notices of proposed rulemakings. Instead, it looks exclusively at the press releases, public statements, speeches, and testimony issued by Commissioners and staff members of the SEC.

10. See *infra* Part V.F.

11. See *infra* Part III.B.

during the Obama administration. Such a course of action would be highly problematic: if the SEC were to choose *not* to address financial stability concerns, this would leave the financial system as a whole more exposed to systemic risks posed and propagated by the equity markets. This Article, therefore, urges the SEC to continue to focus on financial stability in general, and the threats that HFT poses to financial stability in particular—while also recognizing that this focus on financial stability will need to be balanced to some degree with the potentially competing mandates of protecting individual investors and promoting the formation of capital in the short-term.

The remainder of this Article will proceed as follows. Part II will introduce the key concept of “financial stability,” and its various interpretations. Part III will then articulate why and how the SEC should act as a financial stability regulator. Part III’s argument is reasonably high-level and abstract: the remainder of the Article situates the theoretical argument in a more concrete context by considering how the SEC can promote financial stability through its market structure reform project. Part IV discusses the market structure regulation that has been implemented to date, then Part V elaborates on HFT: a major structural change to the equities markets with which the SEC is grappling. Part V considers the issues raised by HFT through the lenses of investor protection, capital formation, and financial stability before analyzing the SEC’s communications on the subject. Encouraged by the depth of commitment to financial stability evinced in these communications, Part VI considers some of the implications that flow from the SEC adopting a proactive financial stability perspective when regulating HFT. Part VII concludes.

II. FINANCIAL STABILITY REGULATION

Despite the ubiquity of the term “financial stability,” there remains a surprising lack of clarity about what “financial stability regulation” is seeking to achieve.¹² Some might assume that “financial stability” connotes stasis and ossification of the financial markets—adherents of such a viewpoint might resist financial stability regulation as seeking to freeze all risk-taking within the financial system. However, this Article argues that a stable financial system can still be dynamic, and, indeed, participants within that stable financial system can and should falter at times: “[d]isturbances in financial markets or at individual financial institutions need not be considered threats to financial stability if they are not expected to damage economic activity at large. In fact, the incidental closing of a financial institution, a rise in asset-price volatility, and sharp and even turbulent corrections in financial markets may be the result of competitive forces, the efficient incorporation of new information, and the economic system’s self-correcting and self-disciplining mechanisms.”¹³ Financial stability regulation is implicated only to the extent that problems with the financial industry have the potential to harm the broader economy.

Others treat financial stability as synonymous with the avoidance of systemic risk. However, as I have argued in the past, the concepts of “financial stability” and “systemic risk” are not simply two sides of the same coin. A narrow consideration of systemic risk can limit regulatory focus to the financial industry itself, whereas a concern for financial stability indicates a focus both on and beyond the financial industry.¹⁴ To elaborate, Steven

12. Allen, *What is Financial Stability*, *supra* note 1, at 929.

13. Gary J. Schinasi, *Defining Financial Stability* 7 (IMF, Working Paper No. 04/187, 2004), <https://www.imf.org/external/pubs/ft/wp/2004/wp04187.pdf>.

14. *Id.*

Schwarcz has proffered one of the most cited definitions of “systemic risk,” which he defines as:

the risk that (i) an economic shock such as market or institutional failure triggers (through a panic or otherwise) either (X) the failure of a chain of markets or institutions or (Y) a chain of significant losses to financial institutions, (ii) resulting in increases in the cost of capital or decreases in its availability, often evidenced by substantial financial-market price volatility.¹⁵

Financial stability regulation is certainly concerned with the markets, institutions, and capital that Schwarcz refers to in his definition of systemic risk, but financial stability regulation should not end its inquiry there. Financial stability regulation should focus attention on the impact that the failure of such markets and institutions (and resulting disruption of capital intermediation) could have on participants in the broader, non-financial economy.¹⁶ To reflect this broader focus and purpose, I have defined financial stability as:

a state of affairs wherein (i) financial institutions and markets are able to facilitate capital intermediation, risk management and payment services in a way that enables sustainable economic growth; (ii) there is no disruption to the ability of financial institutions or markets to carry out such functions that might cause harm to persons (wherever they may be resident) who are not customers or counterparties of those financial institutions, nor participants in those financial markets; and (iii) financial institutions and markets are able to withstand economic shocks (such as the failure of other markets and institutions, or a chain of significant losses at financial institutions) so that (x) there will be no disruption to the performance of the functions set forth in (i) and (y) no harm will be caused to the persons set forth in (ii).¹⁷

Prior to 2008, prudential regulators like the Federal Reserve and the Office of the Comptroller of the Currency generally sought to preserve financial stability by promoting the “safety and soundness” of individual banks.¹⁸ The assumption undergirding pre-Crisis

15. Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, 204 (2008).

16. It should be noted that definitions of systemic risk are not uniform. Concern for the broader economy is expressly referenced in some other definitions of systemic risk, such as the one proffered in a report to the G20 by the IMF, BIS, and FSB, which “defines systemic risk as a risk of disruption to financial services that is (i) caused by an impairment of all or parts of the financial system and (ii) has the potential to have serious negative consequences for the real economy.” Financial Stability Board, *Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations*, BANK INT’L SETTLEMENTS 2 (Oct. 2009), <http://www.bis.org/publ/othp07.pdf>.

17. Allen, *What is Financial Stability*, *supra* note 1, at 932.

18. Traditional prudential regulation has been described as being “aimed at preventing the costly failure of individual institutions.” Samuel G. Hanson et al., *A Macprudential Approach to Financial Regulation*, 25 J. ECON. PERSP. 3, 3 (2011). The GAO has described “safety and soundness” regulation as referring to: “a broad range of issues that relate to the health of a financial institution, including capital requirements, risk management, the quality and diversification of an institution’s portfolio, liquidity and funds management, and adequate procedures for internal controls. To achieve their safety and soundness goals, regulators establish capital requirements and conduct on-site examinations and off-site monitoring to assess an institution’s financial condition, operational security, and governance, and monitor compliance with applicable laws, regulations, and guidance. Regulators also take enforcement actions, and those who charter institutions may close them based on statutory grounds that include insolvency, illiquidity, and unsafe and unsound condition to transact business.” U.S. GOV’T ACCOUNTABILITY OFF., GAO-16-175, FINANCIAL REGULATION: COMPLEX AND FRAGMENTED

prudential regulation was that if each bank were individually safe and sound, then the system as a whole would be strong and nourish the broader economy.¹⁹ Limited attention was paid to the broader system of interconnected relationships and markets within which banks and other financial institutions operated,²⁰ but the inadequacies of such a “microprudential” approach to regulation became glaringly obvious during the Financial Crisis. During that period, stressed financial institutions tried to preserve their individual safety and soundness by selling off assets, but the resulting downward pressure on asset prices harmed other institutions and ultimately undermined the stability of the financial system as a whole.²¹ As a result, prudential regulators have started to embrace a more “macroprudential” focus since the Financial Crisis. Instead of focusing solely on “the financial conditions of individual institutions in isolation,” prudential regulators now strive to “to encompass consideration of potential systemic risks and weaknesses as well.”²²

A shift to macroprudential regulation requires regulators to be more attuned to the markets and other interconnections that link financial institutions, not just banks, and could potentially transmit risks amongst them. Shifting approach is easier said than done, however. The Federal Reserve still tends to approach financial regulation with “bank-tinted lenses,”²³ and as Hellwig has noted, if such regulation “is approached with the traditional tools of either central bankers or microprudential supervisors, there is a danger of falling into a routine of ticking off items on a dash board without seeing what is actually going on. We must recognize that systemic risk transcends the scope of macroeconomic modelling as well as the supervisors’ assessments of individual institutions.”²⁴ In other words, new and complementary perspectives are needed to successfully discharge macroprudential regulation, avoid systemic risk, and promote financial stability.

The International Organization of Securities Commissions (IOSCO) has argued in the wake of the Financial Crisis that securities regulators have unique perspectives and experience in maintaining the integrity of the securities markets, and as such should be actively involved in trying to reduce systemic risk and promote financial stability.²⁵ Systemic risks associated with markets are arguably “more diffuse and difficult to tackle”

STRUCTURE COULD BE STREAMLINED TO IMPROVE EFFECTIVENESS 10 (2016) [hereinafter GAO REPORT].

19. Ben S. Bernanke, Chairman, Bd. of Governors of the Fed. Reserve Sys., Remarks at the Federal Reserve Bank of Chicago 47th Annual Conference on Bank Structure and Competition, Implementing a Macroprudential Approach to Supervision and Regulation (May 5, 2011), <http://www.federalreserve.gov/newsevents/speech/Bernanke20110505a.pdf>.

20. *Id.*

21. Markus K. Brunnermeier, *Deciphering the Liquidity and Credit Crunch 2007-2008*, 23 J. ECON. PERSP. 77, 92 (2009).

22. Ben S. Bernanke, Chairman, Bd. of Governors of the Fed. Reserve Sys., Remarks at the Federal Reserve Bank of Kansas City’s Annual Economic Symposium: Reducing Systemic Risk (Aug. 22, 2008), <https://www.federalreserve.gov/newsevents/speech/bernanke20080822a.htm>.

23. Allen, *FSOC*, *supra* note 2, at 1122. In a similar vein, Elliott notes that “[d]ecision-makers at the Fed would be only human if they relied excessively on the tools with which they were already familiar.” Douglas J. Elliott, *Regulating Systemically Important Financial Institutions That Are Not Banks*, BROOKINGS (May 9, 2013), <https://www.brookings.edu/research/regulating-systemically-important-financial-institutions-that-are-not-banks/>.

24. Martin Hellwig, *Financial Stability and Monetary Policy*, MAX PLANCK INST. FOR RES. ON COLLECTIVE GOODS 17 (Aug. 2015), https://www.coll.mpg.de/pdf_dat/2015_10online.pdf.

25. Technical Committee of the International Organization of Securities Commissions, *Mitigating Systemic Risk: A Role for Securities Regulators* 3 (IOSCO, Discussion Paper No. OR0/1/11, 2011) [hereinafter “IOSCO Systemic Risk Report”].

than those arising from individual institutions,²⁶ and looking at these types of risks may come more naturally to securities regulators than to prudential regulators who have traditionally focused on institutions.²⁷ In particular, IOSCO has argued that securities regulators should prioritize the stable and continuing provision of market liquidity, which can evaporate if pricing information is compromised, or if transactions can't be executed in an orderly manner.²⁸

The participation of securities regulators in financial stability regulation is particularly necessary in the United States, because of its byzantine financial regulatory architecture. There is no one single U.S. regulatory agency charged with financial stability regulation; instead, the Dodd-Frank legislation enacted in the wake of the Crisis created the Financial Stability Oversight Council (FSOC),²⁹ which is a council of the heads of the many federal financial regulatory agencies, and charged it with "identify[ing] risks to the financial stability of the United States" and "respond[ing] to emerging threats to the financial stability of the United States."³⁰ Because the FSOC has limited resources and powers of its own, it can only function effectively if it is able to leverage the expertise of the agencies led by its members, which include the Chair of the SEC.³¹ Although the Treasury Department and Federal Reserve have tended to take the lead in driving the FSOC's agenda,³² neither they, nor any other agency, represented on the FSOC has jurisdiction over (or significant experience overseeing) the securities markets. Because private participants in the securities markets have neither the incentives nor the information necessary to detect and defuse systemic risks on their own,³³ without the active participation of the SEC, there would be a significant hole in the FSOC's understanding and oversight of systemic risks posed and propagated by the equity markets (as well as the markets for debt securities, mutual funds, and some derivatives, which are not the focus of this paper but are within the SEC's jurisdiction).

To be clear, although this Article argues that the SEC need not approach financial stability regulation from a prudential perspective, the Article is not intended as a critique

26. *Id.* at 12. Much of IOSCO's report addressed the risks posed by non-bank financial institutions (including mutual funds): without underestimating the importance of such risks, they (and the prudential and governance rules that apply to them) will not be the focus of this Article.

27. *Id.* at 37.

28. *Id.* Market liquidity has been defined as "the cost—both in expense and time—of buying or selling an asset for cash." Funding liquidity, being "the ability of a financial entity to raise cash by borrowing" can be conceptually distinguished from market liquidity, although a failure of market liquidity will necessarily affect funding liquidity, and vice versa. William C. Dudley, President & CEO, Fed. Reserve Bank of N.Y., Remarks at the Federal Reserve Bank of Atlanta 2016 Financial Markets Conference: Market and Funding Liquidity: An Overview (May 1, 2016) [hereinafter Dudley, Market and Funding Liquidity]. While equally vital to financial stability, funding liquidity tends to fall under the purview of prudential regulators rather than securities regulators.

29. Dodd-Frank Act § 111, 12 U.S.C. § 5321 (2012). The Treasury Secretary, the Chairman of the Federal Reserve, the Comptroller of the Currency, the Chair of the FDIC, the Director of the CFPB, the Chair of the SEC, the Chair of the CFTC, the Director of the Federal Housing Finance Agency and the Chair of the National Credit Union Administration Board are all voting members of the FSOC, as is an independent insurance expert. The FSOC also has five non-voting members: the Director of the Office of Financial Research, the Director of the Federal Insurance Office, and representative state banking, insurance and securities commissioners.

30. Dodd-Frank Act § 112(a), 12 U.S.C. § 5322(a) (2012).

31. Allen, *FSOC*, *supra* note 2, at 1152.

32. *Id.* at 1121–28.

33. Chris Brummer, *Disruptive Technology and Securities Regulation*, 84 FORDHAM L. REV. 977, 1043 (2015).

of prudential regulation more generally. Prudential regulation of individual financial institutions remains a vital component of financial stability regulation, and I have previously argued that the optimal regulatory structure for financial stability regulation in the United States would involve the creation of a single prudential regulator with a robust financial stability mandate and jurisdiction over all financial institutions, including those that are currently overseen by the SEC.³⁴ However, our political realities ensure that such ambitious reforms remain (at least for now) a pipe dream.³⁵ Within our existing financial regulatory structure, prudential regulation should be left to the prudential regulators, and if there are financial institutions currently regulated by the SEC that would pose systemic risks if they failed, the FSOC's designation power may ultimately need to be invoked to allow the Federal Reserve to regulate such institutions.³⁶ A detailed discussion of the FSOC's designation power is beyond the scope of this Article, however. Instead, this Article is focused on the market regulation component of financial stability regulation, to which the SEC is best suited.

III. THE SEC AND FINANCIAL STABILITY REGULATION

Given the lack of clarity about what financial stability regulation entails (which has sometimes produced disagreement about whether the SEC should engage in financial stability regulation at all),³⁷ this Part seeks to outline the contours of what a financial stability mandate might mean for the SEC. First, this Part will introduce the SEC as an agency, then outline some of the skirmishes it has had with the FSOC about financial stability regulation. After concluding that the SEC should not be forced to act as a prudential regulator (as the FSOC has sometimes encouraged it to do), this Part argues that the SEC has the legislative authority to, and should, engage in a type of market-based financial stability regulation that is better suited to the SEC's traditional areas of expertise. However, this Part also recognizes the political challenges associated with financial stability regulation: not least of these is that the SEC has many competing demands on its time and resources.³⁸ This Part therefore concludes with some thoughts on how the SEC should balance financial stability regulation with its other mandates.

A. The SEC as Financial Stability Regulator

The SEC was founded in 1934, as part of the package of New Deal legislation emanating from the Roosevelt White House. It is, as its name suggests, a commission—

34. Allen, *FSOC*, *supra* note 2, at 1138.

35. *Id.*

36. For a discussion of the FSOC's designation power, see *id.* at 1115. Many of the largest broker/dealers regulated by the SEC are already subject to some prudential regulation by the Federal Reserve (even without invoking the designation power), because the parent companies of those broker/dealers are financial holding companies over whom the Federal Reserve has jurisdiction.

37. "There are different views of whether the SEC should be a systemic risk regulator at all, and systemic risk can mean a lot of different things to a lot of different people." Conversation with Mary Jo White, Chair of the SEC, in *The Future of the Securities and Exchange Commission in a Changing World*, AM. ASSEMBLY 20 (May 1, 2015), http://americanassembly.org/sites/default/files/download/events/the_future_of_the_sec_in_a_changing_world.pdf.

38. Donald C. Langevoort, *The SEC, Retail Investors, and the Institutionalization of Securities Markets*, 95 VA. L. REV. 1025, 1028–29 (2009) [hereinafter Langevoort, *Retail Investors*].

comprised of five presidential appointees each serving five-year terms, with a requirement that no more than three commissioners identify with a particular political party.³⁹ The President appoints one of the commissioners as Chair, and that Chair has significant influence over the direction of the agency through his or her discretion regarding staffing and allocation of resources.⁴⁰ The following table sets out the names of the SEC Chairs and Commissioners who held office between January 2010 and January 2017 (communications disseminated by these Commissioners will be discussed in Part V.E):⁴¹

Name:	Party Affiliation:	Title	Appointment Effective:	Appointment Ended:
Kathleen Casey	Republican	Commissioner	7/17/06	8/5/11
Elisse Walter	Democrat	Commissioner	7/9/08	8/9/13
		Chair	12/15/12	4/9/13
Luis Aguilar	Democrat	Commissioner	7/31/08	12/31/15
Troy Paredes	Republican	Commissioner	8/1/08	8/3/13
Mary Schapiro	Independent	Chair	1/27/09	12/14/12
Daniel Gallagher	Republican	Commissioner	11/7/11	10/2/15
Mary Jo White	Independent	Chair	4/10/13	1/20/17
Kara Stein	Democrat	Commissioner	8/9/13	

39. 15 U.S.C. § 78d (2018).

40. Donald C. Langevoort, *The SEC as a Lawmaker: Choices About Investor Protection in the Face of Uncertainty*, 84 WASH. U. L. REV. 1591, 1597 (2006) [hereinafter Langevoort, *SEC as a Lawmaker*].

41. *SEC Historical Summary of Chairmen and Commissioners*, SEC, <https://www.sec.gov/about/sechistoricalsummary.htm> (last visited Mar. 27, 2018).

Michael Piwowar	Republican	Commissioner (Acting Chair from January, 20, 2017–May 4, 2017)	8/15/13	
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As currently structured, the SEC has a number of divisions: most relevant for this Article are the Enforcement Division and the Trading and Markets Division (communications disseminated by senior staff members from these divisions will also be discussed in Part V.E.).⁴²

The SEC's core functions are very different from the core functions of prudential regulators like the Federal Reserve and the Office of the Comptroller of the Currency. The GAO recently described the functions of securities regulation as follows:

Much of the regulation of the securities markets (i.e., debt and equities markets) focuses on integrity of the capital-raising process for companies, resolving conflicts of interest in that process, and requiring full disclosure of material information in order to protect investors and other market users. The prices of stocks traded on the exchanges are generally not regulated; rather, the organization and membership of the exchanges and trading activities are regulated in an attempt to prevent fraud, maintain the integrity of the markets, protect investors, and facilitate capital formation . . . Oversight also includes the establishment and maintenance of standards for fair, orderly, and efficient markets; the facilitation of prompt and accurate clearance and settlement of securities transactions; and the safeguarding of securities and funds. As such, securities market participants, including broker-dealers, self-regulatory organizations (such as stock exchanges and clearing agencies), and transfer agents, are regulated.⁴³

To paraphrase former SEC Commissioner Gallagher, prudential regulation seeks to avoid the failure of institutions, while securities regulation seeks to encourage risk-taking, and puts in place procedures to manage inevitable failures.⁴⁴ This is, of course, something of an over-simplification: the SEC is committed to preventing the failure of institutions that provide critical market infrastructure like the Depository Trust Company (the Federal Reserve also has jurisdiction over these corporations as “designated financial market utilities”).⁴⁵ However, the SEC has not typically been concerned with promoting the

42. *Divisions and Offices*, SEC, <https://www.sec.gov/divisions.shtml> (last visited Mar. 27, 2018).

43. GAO REPORT, *supra* note 18, at 10.

44. Daniel M. Gallagher, Comm’r, SEC, *The Philosophies of Capital Requirements* (Jan. 15, 2014), <https://www.sec.gov/news/speech/2014-spch011514dmg>.

45. *Designated Financial Market Utilities*, BD. OF GOVERNORS OF THE FED. RESERVE SYS., https://www.federalreserve.gov/paymentsystems/designated_fmu_about.htm (last visited Mar. 27, 2018).

Financial market utilities (FMUs) are multilateral systems that provide the infrastructure for transferring, clearing, and settling payments, securities, and other financial transactions among financial institutions or between financial institutions and the system. In cases where, among other things, a failure or a disruption to the functioning of an FMU could create, or increase, the risk of significant liquidity or credit problems spreading among financial institutions or markets and thereby threaten the stability of the U.S. financial system, the FMU may be designated as systemically important by the Financial Stability Oversight Council (Council).*Id.*

stability of individual client-facing institutions.⁴⁶ Notwithstanding this difference between the securities and prudential approaches to regulation of *institutions*, to the extent that securities regulation is intended to ensure that the *markets* remain robust to shocks and can continue to facilitate the flow of capital and broader economic growth, it is also a type of financial stability regulation.⁴⁷

As such, the SEC can make a contribution to financial stability in its capacity as a regulator of markets, even if it does not want to police the solvency of most individual financial institutions. Certainly, there has been some positive collaboration between the SEC and the other members of the FSOC with regard to the promotion of financial stability since the FSOC was established in 2010.⁴⁸ In a recent report on the U.S. financial regulatory structure, the GAO noted that “[m]ember agencies . . . generally stated that participation in the Systemic Risk Committee and other FSOC activities helped them build informal communication channels and good working relationships among staff across the agencies, which was not always common before the creation of the FSOC and the committee”.⁴⁹ However, collaboration is still impeded (at least to some degree) by conflicting data sharing policies amongst the various financial regulatory agencies.⁵⁰ Furthermore, the relationship between the Treasury- and Federal Reserve-dominated FSOC and the SEC has been fraught at times—particularly when the FSOC has urged the SEC to implement increased prudential regulation of mutual funds.

The SEC is the primary regulator of mutual funds,⁵¹ but the SEC Commissioners were unable to come to an agreement about how to regulate money market mutual funds post-crisis.⁵² As a result (and with the approval of then-SEC Chair Schapiro), the FSOC proposed making recommendations to the SEC in November 2012 “regarding three possible avenues of reform of [money market mutual funds], indicating that any of those reforms would help mitigate the dangers that MMFs pose to financial stability.”⁵³ Instead of accepting those recommendations, the SEC Commissioners proposed their own rule “that covered two potential avenues for reform, but each of these two avenues was on a much more limited scale than any of the FSOC’s proposals.”⁵⁴ On another occasion, in December 2014, the FSOC issued a Notice Seeking Comment on Asset Management Products and Activities that stated while the SEC “is undertaking several initiatives that would apply to investment companies and investment advisers regulated by the SEC and may address some of the risks described in this Notice . . . the SEC’s initiatives are not

46. See *infra* notes 62–64 and accompanying text (noting that the SEC has appeared ill-suited for prudential regulation).

47. Allen, *FSOC*, *supra* note 2, at 1099.

48. Commissioner Stein, for example, noted that:

The Commission needs to be a helpful contributor to the FSOC . . . We should embrace our fellow regulators’ efforts and work to improve them. We do not lose power as an agency by working with other regulators, we leverage it. We gain knowledge and expertise in new areas. And other regulators gain knowledge and expertise by working collaboratively with us. Kara M. Stein, Comm’r, SEC, Remarks at the “SEC Speaks” Conference (Feb. 21, 2014), <https://www.sec.gov/News/Speech/Detail/Speech/1370540830487>.

49. GAO REPORT, *supra* note 18, at 69.

50. *Id.* at 72–73.

51. Mutual funds must register with the SEC pursuant to 15 U.S.C. § 80a-8 (2018).

52. Allen, *FSOC*, *supra* note 2, at 1119.

53. *Id.* at 1118–19.

54. *Id.*

specifically focused on financial stability.”⁵⁵ In response, Chair White implied that while the SEC can provide a market perspective to the FSOC’s efforts, the systemic risk posed by investment companies is outside of the SEC’s regulatory scope.⁵⁶ Later in 2016—when the FSOC identified a number of systemic risks associated with mutual funds and other asset management businesses and made some recommendations for addressing such risks⁵⁷—SEC Chair Mary Jo White issued a public statement that the FSOC’s recommendations “should not be read as an indication of the direction that the SEC’s final asset management rules may take.”⁵⁸

Rhetoric from Commissioners Gallagher and Piwowar regarding the FSOC has gone even further—some of their public statements have been openly antagonistic. Gallagher has commented that “[f]or the past several years, banking regulators and others have attempted to graft their systemic risk mandate on to the SEC’s own or otherwise dragoon the agency into the already broad group of systemic risk regulators. This is as unwise as it is impractical.”⁵⁹ Gallagher also stated that “the move to impose prudential regulation on our capital markets, in particular by applying a one-size-fits-all approach to capital requirements, is nothing short of an existential threat to those markets—and to the SEC itself.”⁶⁰ Piwowar has used choice epithets like “The Bully Pulpit of Failed Prudential Regulators” and a “Vast Left Wing Conspiracy to Hinder Capital Formation” to describe the FSOC, and unambiguously stated his commitment “to defend our jurisdiction from the prudential regulators’ [FSOC]-enabled turf war.”⁶¹ While this level of antipathy towards

55. Asset Management Products and Activities, 79 Fed. Reg. 77,488, 77,489 (FSOC Dec. 24, 2014) (notice seeking comment).

56. Mary Jo White, Chair, SEC, Speech at The New York Times DealBook Opportunities for Tomorrow Conference Held at One World Trade Center, New York, N.Y.: Enhancing Risk Monitoring and Regulatory Safeguards for the Asset Management Industry (Dec. 11, 2014), <http://www.sec.gov/News/Speech/Detail/Speech/1370543677722#.VKy7Slu61UQ>.

Truly tackling systemic risk in any area, obviously, demands a broader program than one agency can execute. Systemic risks cannot be addressed alone—they are, after all, ‘systemic.’ Risks that could cascade through our financial system could have an impact on a range of market participants, many of which we do not oversee. The Financial Stability Oversight Council (FSOC) is an important forum for studying and identifying systemic risks across different markets and market participants. The market perspective that the SEC brings is an essential component of FSOC’s efforts. And FSOC’s current review of the potential risks to the stability of U.S. financial system of asset managers is a complement to the work we are now undertaking.*Id.*

57. *Update on Review of Asset Management Products and Activities*, FSOC (Aug. 27, 2015), <https://www.treasury.gov/initiatives/fsoc/news/Documents/FSOC%20Update%20on%20Review%20of%20Asset%20Management%20Products%20and%20Activities.pdf>.

58. Mary Jo White, Chair, SEC, Statement on Financial Stability Oversight Council’s Review of Asset Management Products and Activities (Apr. 18, 2016), <https://www.sec.gov/news/statement/white-statement-041816.html>.

59. Daniel M. Gallagher, Comm’r., SEC, Remarks to the Georgetown University Center for Financial Markets and Policy Conference on Financial Markets Quality (Sept. 16, 2014), <https://www.sec.gov/news/speech/2014-spch091614dmg.html> [hereinafter Gallagher, Remarks to the Georgetown University Center].

60. Daniel M. Gallagher, Comm’r., SEC, The Importance of the SEC’s Rulemaking Agenda—You Are What You Prioritize: Remarks at the 47th Annual Securities Regulation Seminar of the Los Angeles County Bar Association (Oct. 24, 2014), <https://www.sec.gov/News/Speech/Detail/Speech/1370543283858> [hereinafter Gallagher, SEC’s Rulemaking Agenda].

61. Michael S. Piwowar, Comm’r., SEC, Remarks at AEI Conference on Financial Stability (July 15, 2014), <https://www.sec.gov/News/Speech/Detail/Speech/1370542309109>.

the FSOC may be unjustified, it is true that—in many respects—attempts by the broader financial regulatory community to force the SEC to serve as a prudential regulator seem to be forcing a square peg into a round hole.⁶² The SEC has not demonstrated much affinity or aptitude for prudential regulation in the past⁶³ (with the SEC’s Consolidated Supervised Entities program being a notable and disastrous attempt).⁶⁴ Instead, the SEC’s main contribution to financial stability regulation should reflect its expertise as a regulator of markets.

It is very difficult to articulate a concrete job description for a financial stability regulator. One of the better formulations comes from Hellwig, who notes that such regulators should be asking themselves “how different developments fit together and where the unseen risks might be hidden.”⁶⁵ This is in many respects a data-driven task. As a UK government report noted, “the practical assessment and management of financial systemic risk . . . must ‘work back from the data’ and account for the likely actions and reactions of market participants.”⁶⁶ With its broad and ongoing oversight over the equity markets, the SEC is positioned to be the first to see new and unanticipated types of risks developing in the data it collects from those markets. It can then communicate these risks to the other members of the FSOC, and also take steps to propose and refine SEC rules relating to data disclosure, business conduct, and emergency measures, in an attempt to mitigate nascent systemic risks.⁶⁷ The SEC therefore has an important role to play as a financial stability regulator, albeit not in the mold of a traditional prudential regulator. The next Part will make the argument that the SEC also has the legal authority to play such a role.

B. Legislative Basis for the SEC’s Financial Stability Mandate

The SEC has two clear legislative mandates: protecting investors, and promoting

62. Coffee and Sale note that “it is open to question whether capital adequacy regulation would ever become a major priority for the SEC. By culture and philosophy, the SEC is a disclosure regulator, whose concerns with risk and leverage are normally satisfied once full disclosure is made.” John C. Coffee, Jr. & Hillary A. Sale, *Redesigning the SEC: Does the Treasury Have a Better Idea?*, 95 VA. L. REV. 707, 777–78 (2009).

63. Robert B. Thompson, *The SEC After the Financial Meltdown: Social Control Over Finance?*, 71 U. PITT. L. REV. 567, 569 (2010). See Coffee Jr. & Sale, *supra* note 62, at 775 (explaining at best, “prudential supervision has been only a secondary responsibility” for the SEC).

64. In 2004, the SEC “put into place its ‘consolidated supervised entity’ (‘CSE’) framework, which allowed broker-dealers and their holding companies to elect to be subject to SEC supervision with respect to capital adequacy on a group-wide basis voluntarily. The SEC recently abandoned the CSE program, conceding its failure.” Coffee Jr. & Sale, *supra* note 62, at 776.

65. Hellwig, *supra* note 24, at 20.

66. Sir Mark Walport, *FinTech Futures: The UK as a World Leader in Financial Technologies*, UK GOV’T OFF. FOR SCI. 48 (2015),

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/413095/gs-15-3-fintech-futures.pdf. Dombalagian also notes that “[t]o monitor financial stability, regulators must be able to gather and analyze information from an even broader range of sources in order to identify conditions that may forewarn economic shock or the cascading failure of institutions”. Onnig H. Dombalagian, *Preserving Human Agency in Automated Compliance*, 11 BROOK. J. CORP. FIN. & COM. L. 71, 80 (2016) [hereinafter Dombalagian, *Preserving Human Agency*].

67. IOSCO has noted that securities regulators seeking to promote systemic stability have the following regulatory methods at their disposal: “measures to increase transparency, business conduct rules, organisational, prudential and governance requirements and emergency powers.” IOSCO Systemic Risk Report, *supra* note 25, at 4.

capital formation.⁶⁸ The words “investor protection” and “protection of investors” have been sprinkled liberally through the Securities Act and the Securities Exchange Act since their enactment in the 1930s,⁶⁹ and amendments made in 1996 to Section 2 of the Securities Act and Section 3 of the Securities Exchange Act enshrine the dual mandate by requiring the SEC to consider “whether the action will promote efficiency, competition, and capital formation” (as well as investor protection).⁷⁰ There is, however, no express mention of financial stability in the Securities Act or Securities Exchange Act.

Support for a financial stability mandate can nonetheless be found in the oft-ignored language of Section 2 of the Securities Exchange Act of 1934. This provision reflects the context for the enactment of the securities laws—a response to the stock market crash of 1929 and ensuing Great Depression⁷¹—and explains that the securities laws were enacted in part to promote the stability of the broader financial system, in the interests of economic wellbeing:

... transactions in securities as commonly conducted upon securities exchanges and over-the-counter markets are effected with a national public interest which makes it necessary to provide for regulation and control of such transactions and of practices and matters related thereto ... in order to protect interstate commerce, the national credit, the Federal taxing power, to protect and make more effective the national banking system and Federal Reserve System ... National emergencies, which produce widespread unemployment and the dislocation of trade, transportation, and industry, and which burden interstate commerce and adversely affect the general welfare, are precipitated, intensified, and prolonged by ... sudden and unreasonable fluctuations of security prices ... and to meet such emergencies the Federal Government is put to such great expense as to burden the national credit.⁷²

This Part recognizes the impact that “sudden and unreasonable fluctuations of security prices” (excessive volatility, in today’s parlance) can have on the banking system, and by extension, employment and the broader economy. It also recognizes that government intervention may need to be invoked *ex post* to address emergencies stemming from such volatility. Modern day regulatory efforts to promote financial stability, and avoid such negative outcomes, are consistent with this Section 2.

In addition, the SEC’s efforts to promote the stability of the securities markets can be conceptualized as a type of indirect investor protection, and thus as authorized by Section 2 of the Securities Act and Section 3 of the Securities Exchange Act. I have previously argued that, because investors “are—collectively—hurt more by the economic disruptions that follow a financial crisis than they are from individual instances of misconduct”, promoting financial stability is the best way for the SEC to protect the interests of investors as a cohort.⁷³

68. Abraham J.B. Cable, *Mad Money: Rethinking Private Placements*, 71 WASH. & LEE L. REV. 2253, 2263 (2014).

69. Michael D. Guttentag, *Protection from What? Investor Protection and The JOBS Act*, 13 U.C. DAVIS BUS. L.J. 207, 212 (2013).

70. 15 U.S.C. §§ 77b(b) (1933); 78c(f) (1934), as amended by Section 106 of NSMIA.

71. MICHAEL S. BARR ET AL., FINANCIAL REGULATION: LAW AND POLICY 47–49 (West Academic, 2016).

72. 15 U.S.C. § 78b(3)–(4) (1934).

73. Hilary J. Allen, *Financial Stability Regulation as Indirect Investor Consumer Protection Regulation*:

Finally, some of the provisions in Dodd-Frank provide further legislative support for a financial stability mandate for the SEC. For example, Section 112(b) of Dodd-Frank requires each voting member of the FSOC (of whom the SEC Chair is one) to submit an annual statement to Congress outlining what they see as threats to financial stability—this serves as an implicit direction to the SEC to monitor the financial system for such threats. Section 113 of Dodd-Frank implicitly directs the SEC to consider whether the financial institutions within its purview are systemically significant enough to warrant designation as requiring heightened supervision by the Federal Reserve. Section 120 of Dodd-Frank also implicitly directs the SEC “to monitor potentially problematic financial activities or practices, to enable [it] to determine whether the FSOC should make a recommendation to apply new or heightened standards or safeguards to such activities or practices.”⁷⁴

C. Competing Mandates

In pursuing any regulatory reform project, the SEC is required by law to consider both “investor protection” and “capital formation,”⁷⁵ which are often seen as competing and distinct regulatory ends that need to be “balanced.”⁷⁶ This Article argues that financial stability is also a responsibility of the SEC, which will further complicate the SEC’s calculus. However, it is important to note that investor protection, capital formation and financial stability are not always—perhaps not even usually—orthogonal concepts.⁷⁷ For example, the SEC often seeks to protect individual investors by implementing and enforcing anti-fraud rules that prevent intermediaries and the providers of market infrastructure from taking advantage of such investors.⁷⁸ However, investors are also protected, as a cohort, if the securities markets are functioning smoothly.⁷⁹ By inspiring confidence, smoothly functioning markets also encourage investors to participate in those markets, and thus financial stability also contributes to capital formation.⁸⁰ Protections that reassure individual investors that they will be afforded a level informational playing field, and be protected from unscrupulous conduct by other market actors, also inspire confidence and encourage capital formation.⁸¹

Implications for Regulatory Mandates and Structure, 90 TUL. L. REV. 1113, 1114 (2016) [hereinafter Allen, *Mandates and Structure*].

74. Allen, *FSOC*, *supra* note 2, at 1129.

75. See *supra* notes 69–70 and accompanying text.

76. Cable, *supra* note 68, at 2258; “[O]pen-ended, potentially conflicting mandates have left regulators without clear guidance as to how to balance the costs and benefits of regulatory policy.” ONNIG H. DOMBALAGIAN, CHASING THE TAPE: INFORMATION LAW AND POLICY IN CAPITAL MARKETS 21 (2015) [hereinafter DOMBALAGIAN, CHASING THE TAPE].

77. “Obviously, each of these mandates is intertwined with the others—investors are better protected when markets are fair and orderly; markets are more orderly and efficient when investors have access to honest brokers and accurate information; and capital formation is more efficient when markets are functioning smoothly and investors are confident.” Mary L. Schapiro, Chairman, SEC, Remarks at the National Conference of the Society of Corporate Secretaries and Governance Professionals (July 9, 2010), <https://www.sec.gov/news/speech/2010/spch070910mls.htm> [Schapiro, Corporate Secretaries and Governance Professionals].

78. Guttentag, *supra* note 69, at 223–24.

79. See *supra* note 73 and accompanying text.

80. Troy A. Paredes, *On the Decision to Regulate Hedge Funds: The SEC’s Regulatory Philosophy, Style and Mission*, 2006 U. ILL. L. REV. 975, 999 (2006).

81. IOSCO Systemic Risk Report, *supra* note 25, at 13; Tamar Frankel, *Regulation and Investors’ Trust in the Securities Markets*, 68 BROOK. L. REV. 439, 444 (2002); Guttentag, *supra* note 69, at 218.

Clearly, then, there is no bright line that can be drawn between efforts to promote investors, efforts to promote capital formation and efforts to promote financial stability. Efforts to support one end may be salutary for the other ends as well. There are nonetheless conflicts that can arise between the different goals. Perhaps the most obvious conflict is that regulation that seeks to protect investors and/or financial stability can hamper capital formation by imposing costs on the issuers of securities and other market participants. Another, more nuanced, example of potential conflict between mandates might involve the disclosure of information: while disclosure has always been a linchpin of the SEC's investor protection efforts,⁸² the goal of financial stability may sometimes be best served by discouraging transparency (for example, halting the release of information that would damage market confidence in a time of panic).⁸³ Mandated transparency can also hamper capital formation if it dissuades investors from trading large blocks of securities (such investors often fear that if their large buy or sell orders are made public, the market may move against the trade and make it more costly to execute).⁸⁴ Less transparency may therefore improve liquidity and efficiency in the equities markets in some circumstances.

When mandates conflict, the SEC must choose which one to prioritize. Ultimately, the choice of primary mandate can be conceptualized as preferring one particular constituency to others: to the extent that the SEC decides to prioritize investor protection over other conflicting ends, it is focusing on the direct protection of individual investors in the securities markets from information asymmetries and misleading practices.⁸⁵ Alternatively, if financial stability is the ultimate goal, then the desired regulatory outcome is the sustained growth of the broader economy (being the economy beyond the financial industry)⁸⁶—both retail and institutional investors benefit from this type of regulatory goal in the long run, but they are protected indirectly, and some individual investors may suffer from an approach that is more focused on avoiding collective harm to investors and non-investors alike, rather than on avoiding harm to any one single investor or category of investors. When capital formation is the primary goal of regulation, efficiency—in the sense that “the aggregate economic benefits exceed the aggregate economic costs, even though some market participants may be forced to bear costs on net while others reap benefits on net”⁸⁷—is prioritized above all else, and there is little concern for how capital

82. Guttentag, *supra* note 69, at 209;

83. For example, New York Federal Reserve President William Dudley has noted “disclosing in real time who was borrowing from the Federal Reserve’s Discount Window would likely undercut the efficacy of the window. Banks might be reluctant to borrow if it were immediately made public because such borrowing might be construed in the market as a sign of weakness. Stigmatizing Discount Window use by banks would make this tool less effective as a lender of last resort backstop for bank liquidity needs.” William C. Dudley, *The Role of the Federal Reserve: Lessons from Financial Crises*, HARV. L. SCH. F. ON CORP. GOVERNANCE & FIN. REG. (Apr. 12, 2016), <https://corpgov.law.harvard.edu/2016/04/12/the-role-of-the-federal-reserve-lessons-from-financial-crises/>.

84. Nicholas Crudele, *Dark Pool Regulation: Fostering Innovation and Competition while Protecting Investors*, 9 BROOK. J. CORP. & FIN. & COM. L. 569, 569 (2015); see also Jordan M. Marciello, *Are You Afraid of the Dark: How the New York Attorney General is Shedding Light on Dark Pools and High Frequency Trading*, 49 SUFFOLK U. L. REV. 163, 164 (2016) (discussing high frequency trading and dark pools).

85. Allen, *Mandates and Structure*, *supra* note 73, at 1114; see also Guttentag, *supra* note 69, at 210 for a taxonomy of direct investor harms.

86. Allen, *FSOC*, *supra* note 2, at 1093.

87. Yoon-Ho Alex Lee, *The Efficiency Criterion for Securities Regulation: Investor Welfare or Total Surplus?*, 57 ARIZ. L. REV. 85, 87 (2015).

is distributed.⁸⁸ As such, a regulatory system with an unalloyed focus on efficiency and capital formation would not be troubled by a securities market ecosystem that benefits industry participants while contributing little to the non-financial economy.

While there will certainly be situations where it makes sense for the SEC to emphasize capital formation or the protection of individual investors, financial instability can be enormously costly for macroeconomic growth—and therefore for society in general.⁸⁹ As such, financial stability is the normative regulatory goal designed to benefit the broadest group of people. As I have explored previously, prioritizing financial stability over other regulatory goals is an inherently precautionary exercise, which entails rejecting strict criteria of efficiency (including quantified cost-benefit analysis) as the primary test for financial stability regulation.⁹⁰ While regulators should certainly be mindful of the costs of their regulations, the consequences of financial instability are potentially dire and irreversible,⁹¹ and so the SEC should be afforded the flexibility to make informed value judgments about the best path to facilitate long-term stability⁹²—notwithstanding that doing so will create compliance costs, and therefore potentially reduce financial industry profitability, in the short-term.⁹³ Unfortunately, there are difficult political economy issues associated with financial stability regulation, because it is very difficult to show when such regulation has succeeded (how can the SEC demonstrate that a crisis would have occurred but for the SEC's regulatory efforts?).⁹⁴ Indeed, the more successful regulation is in maintaining financial stability, the less need there seems to be for continuing such regulation. As such, it is hard to rally public support for financial stability regulation, except in the immediate aftermath of financial crises.⁹⁵

Fear of unintended consequences and lack of public support can sap regulators' confidence in their ability to discharge their regulatory functions:⁹⁶ the SEC has often struggled with how precautionary it should be in promoting investor protection,⁹⁷ and there is much greater scope for unintended consequences when addressing something as complex as financial stability. Furthermore, although there are several legislative bases that the SEC

88. DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 23; Allen, FSOC, *supra* note 2, at 1110.

89. For a discussion of some of the social costs of the Financial Crisis, see Allen, FSOC, *supra* note 2, at 1093–97.

90. For a thorough discussion of why quantified cost-benefit analysis is not appropriate for financial stability regulation, see John C. Coates IV, *Cost-Benefit Analysis of Financial Regulation: Case Studies and Implications*, 124 YALE L. J. 882 (2015).

91. Hilary J. Allen, *A New Philosophy for Financial Stability Regulation*, 45 LOY. U. CHI. L. J. 173, 190–91 (2013) [hereinafter Allen, *A New Philosophy*]. “[T]he social consequences of the recessions that follow deep financial crises are lasting, notwithstanding that the broader economy will eventually cycle into a more prosperous time.” *Id.* at 193.

92. *Id.* at 206.

93. *Id.* at 193.

94. *Id.* at 190.

95. For a discussion of the political economy of financial stability regulation, see John C. Coffee Jr., *The Political Economy of Dodd-Frank: Why Financial Reform Tends to Be Frustrated and Systemic Risk Perpetuated*, 97 CORNELL L. REV. 1019, 1031 (2012).

96. Donald C. Langevoort, *The SEC as a Bureaucracy: Public Choice, Institutional Rhetoric, and the Process of Policy Formation*, 47 WASH. & LEE L. REV. 527, 530 (1990) [hereinafter Langevoort, *SEC as a Bureaucracy*].

97. Paredes, *supra* note 80, at 1006–10. Pasquale has also noted how cautious the SEC has been in taking steps to address the investor protection concerns associated with HFT. Frank Pasquale, *Law's Acceleration of Finance: Redefining the Problem of High Frequency Trading*, 36 CARDOZO L. REV. 2085, 2106 (2015).

could invoke in support of promoting financial stability,⁹⁸ there is no unambiguous legislative direction for it to do so. It would not be surprising, then, if the SEC were to ignore financial stability concerns, or at least subsume them to investor protection and capital formation concerns (fear of litigation from regulated entities may also incentivize the SEC to avoid financial stability regulation and focus on its more concrete, and thus easier to defend, statutory responsibilities). However, if the SEC fails to look out for the stability of the markets it oversees, there is no other regulatory body that will do so, and the financial system as a whole will be more vulnerable. As such, the IMF concluded in 2015 that “[t]he FSOC should be strengthened with member agencies [like the SEC] being given an explicit financial stability mandate.”⁹⁹ Even in the absence of such a legislative change, the SEC should be encouraged to adopt reforms that are sensibly designed to mitigate the risks of instability.

IV. EQUITY MARKET STRUCTURE REGULATION IN HISTORICAL CONTEXT

Thus far, this Article’s discussion of the SEC’s regulatory goals has been rather abstract. And by necessity, such a discussion must remain somewhat abstract, because we cannot foresee the precise threats to investor protection, capital formation and financial stability that might arise in the future. Nonetheless, to provide a more concrete illustration of the role that the SEC can play in promoting financial stability, the second half of this Article will look at the SEC’s current equity market structure reform effort. In particular, this Article will use high frequency trading—a practice that has been identified by the FSOC as creating potential risks and vulnerabilities for the financial system¹⁰⁰—as a case study that illustrates the type of contribution that the SEC can make as a financial stability regulator. Part V will consider the potential impacts of HFT on the equity markets, and the financial system more broadly, and Part VI will consider possible stability-oriented responses from the SEC. Before delving into those issues, however, this Part IV will provide context by explaining the SEC’s historical approach to equity market structure regulation: this is by no means a complete catalogue of the market structure regulation that has been implemented during the SEC’s existence, however. Rather, it is a narrative that serves to highlight the SEC’s initial reluctance towards, and then incrementally increasing comfort with, taking action as a market structure regulator.

While Section 2 of the Securities Exchange Act made it clear that part of the motivation for creating the SEC in 1934 was concern about “unnecessary, unwise and destructive speculation” in the securities markets,¹⁰¹ the SEC has at times been critiqued for its reluctance to regulate those markets.¹⁰² Werner, for example, argued that the first thirty years of the SEC’s existence were marked by “inaction and equivocation in exercising power over broker-dealer practices, commission rates and exchange self-

98. See *supra* Part III.B.

99. *The United States: Financial System Stability Assessment*, IMF 7 (2015), <http://www.imf.org/external/pubs/ft/scr/2015/cr15170.pdf>.

100. 2016 ANNUAL REPORT, FSOC 122 (2016), <https://www.treasury.gov/initiatives/fsoc/studies-reports/Documents/FSOC%202016%20Annual%20Report.pdf>.

101. Walter Werner, *The SEC As A Market Regulator*, 70 VA. L. REV. 755, 757 (1984) (quoting President Roosevelt).

102. Stavros Gadinis & Howell E. Jackson, *Markets as Regulators: A Survey*, 80 S. CAL. L. REV. 1239, 1261 (2007).

government, and with disclaimers of SEC power to act as an economic regulator.”¹⁰³ For the early SEC, Werner argued, it was preferable to regulate the capital markets using the statutorily-designated means of promoting disclosure and prohibiting fraud. Market structure regulation, in contrast, would require the SEC to regulate practices that could harm the markets, but were “equally capable of operating benignly”—and to do so with little Congressional guidance as to which market practices were and were not desirable.¹⁰⁴ While poorly functioning securities markets could certainly harm investors, the harm would be indirect, and the benefits of market regulation would therefore be largely invisible to the members of the investing public receiving those benefits (except perhaps in moments of crisis).¹⁰⁵ Conversely, attempts to regulate existing market infrastructure would have had a direct and disruptive impact on incumbent players, who would have had a vested interest in strongly resisting reform.¹⁰⁶ Werner thus concluded that it was not surprising that, in its early years, the SEC preferred to allocate its limited resources to dealing with statutorily-mandated anti-fraud and disclosure measures, rather than to preparing for a possible—but by no means guaranteed—breakdown of the securities markets.¹⁰⁷

Such a breakdown did occur, however, in the form of the back-office paperwork crisis that spanned 1967–1970: during that period “over 100 NYSE firms failed, including several large ones, as a result of their inability to document customer trades properly and in a timely manner.”¹⁰⁸ This prompted the SEC to become somewhat more involved in market structure regulation.¹⁰⁹ In addition, in 1975, the SEC received a legislative direction from Congress (in the form of a new Section 11A of the Securities Exchange Act) to establish a new national market system that would allow for competition amongst trading venues.¹¹⁰ Nonetheless, the SEC made very slow progress in tackling market regulation.¹¹¹ Writing in 1985, Macey and Haddock noted that the SEC had done little to implement Congress’s vision of a national market system.¹¹² They explained the SEC’s failure to act using a public choice framework, arguing that “[t]he SEC has chosen to disregard Congress and instead support inefficient rules that grant favors to special interests, such as the exchange specialists, and to the exchanges themselves.”¹¹³ Macey and Haddock dismissed

103. Werner, *supra* note 101, at 772.

104. *Id.* at 757–58.

105. *Id.* at 775, 779.

106. *Id.* at 764.

107. *Id.* at 764–65.

108. Jerry W. Markham, *High Speed Trading on Stock and Commodity Markets—From Courier Pigeons to Computers*, 52 SAN DIEGO L. REV. 555, 590 (2015); *see also* Werner, *supra* note 101, at 770. “A surge in trading volume created more paper and paperwork than could be handled by an industry still operating largely as it had in horse-and-buggy days. An apparently healthy industry became deathly sick over-night as over a hundred broker-dealers, including many old and large firms, failed.” *Id.* at 770.

109. Joel Seligman, *Cautious Evolution or Perennial Irresolution: Stock Market Self-Regulation During the First Seventy Years of the Securities and Exchange Commission*, 59 BUS. LAW. 1347, 1367–68 (2004).

110. Mary Jo White, Chair, SEC, SEC Remarks Before the SEC Historical Society—“The Continuous Process of Optimizing the Equity Markets” (Jun. 2, 2016), <https://www.sec.gov/news/speech/the-continuous-process-of-optimizing-the-equity-markets.html> [hereinafter White, Remarks before the SEC Historical Society].

111. For an extensive discussion of the SEC’s use of its powers under Section 11A between 1975 and 2005, *see* Dale A. Oesterle, *Regulation NMS: Has the SEC Exceeded its Congressional Mandate to Facilitate a “National Market System” in Securities Trading*, 1 N.Y.U. J.L. & BUS. 613 (2005).

112. Jonathan R. Macey & David D. Haddock, *Shirking at the SEC: The Failure of the National Market System*, 1985 U. ILL. L. REV. 315, 322 (1985).

113. *Id.* at 361.

the concerns that the SEC was raising at the time about the potential for market fragmentation and internalization of order flow,¹¹⁴ as well as the difficulties it would face in regulating a more fragmented market,¹¹⁵ but it is possible that the SEC was genuinely paralyzed by uncertainty about how to address these concerns.¹¹⁶

Finally, in 2005, the SEC made a significant intervention in market structure with the adoption of Regulation NMS. NMS has been described by former SEC Chair Mary Jo White as “a landmark body of rules that govern all aspects of today’s national market system.”¹¹⁷ It was intended “to counter order flow fragmentation, promote equal regulation of market centers and greater order interaction, and increase displayed depth of trading interest,”¹¹⁸ and the adopting release for Regulation NMS indicates that enhancing capital formation was the SEC’s primary motivator for adopting the Regulation.¹¹⁹ Notwithstanding one’s view of Regulation NMS (and the regulation has certainly been criticized by many),¹²⁰ its adoption signified the SEC’s increased comfort with getting involved in equities market structure regulation. However, the equity markets have changed significantly even since 2005 (in part as a response to Regulation NMS),¹²¹ and the SEC must again consider its role in regulating these altered markets—this time, in a post-Financial Crisis era where there is increased focus on financial stability. The next Part will consider in detail one of the forces reshaping the structure of these equity markets: high frequency trading.

V. CASE STUDY: HIGH FREQUENCY TRADING

High frequency trading or “HFT” has exploded in the last fifteen years,¹²² abetted by

114. Internalization refers to “withholding of retail orders from other market centers for the purpose of executing them ‘in-house’ as principal, without exposing those orders to buying and selling interests in those other market centers.” *Id.* at 343.

115. *Id.* at 341, 343, 346.

116. Even when it comes to enforcement, a function that the SEC has traditionally had much more facility with, the SEC has historically been timid in approaching cases where the outcome is uncertain, and there is a significant drain on resources. Donald C. Langevoort, *The SEC and the Madoff Scandal: Three Narratives in Search of a Story*, 2009 MICH. ST. L. REV. 899, 906–07. The SEC may simply have lacked the resources or the organizational mindset to engage in significant market structure reform at that time. See Seligman, *supra* note 109, at 1384; Werner, *supra* note 101, at 772.

117. White, Remarks Before the SEC Historical Society, *supra* note 110.

118. Stavros Gadinis, *Market Structure for Institutional Investors: Comparing the US and the EU Regimes*, 3 VA. L. & BUS. REV. 311, 331 (2008).

119. Relevantly, the SEC notes “[i]n its extended review of market structure issues and in assessing how best to achieve an appropriate balance between competition among markets and competition among orders, the Commission has been guided by a firm belief that one of the most important goals of the equity markets is to minimize the transaction costs of long-term investors and thereby to reduce the cost of capital for listed companies.” Regulation NMS, 70 Fed. Reg. 37,496, 37,499 (June 29, 2005) (codified at 17 C.F.R. pts. 200, 201, 230, 240, 242, 249, 270).

120. See DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 69. These critics argue that broker/dealer’s duties of best execution, which would allow for competition on aspects of the trade in addition to price, would be more successful than the Order Protection Rule in improving execution quality. Yadav has argued that because it “helps order anticipation strategies to flourish,” Regulation NMS has encouraged much of the high frequency trading that has driven institutional investors to dark pools. Yesha Yadav, *How Algorithmic Trading Undermines Efficiency in Capital Markets*, 68 VAND. L. REV. 1607, 1666 (2015) [hereinafter Yadav, *Algorithmic Trading*].

121. Some have argued that it was the promulgation of Regulation NMS that enabled HFT to proliferate. See Pasquale, *supra* note 97, at 1027.

122. HFT has been in use since at least 2000. TECHNICAL COMMITTEE OF THE INTERNATIONAL

technological innovation and regulatory change, to the point where it is now thought to account for more than half of the volume of all stocks trading in the United States.¹²³ Because high frequency traders now supply a significant portion of the liquidity available to the equity markets, any disruption to the operations of such traders can disrupt the orderly functioning of those markets, with potential flow-on effects for other linked markets and the broader economy. Regulatory reform related to HFT therefore offers an excellent opportunity for the SEC to embrace the role of market-focused financial stability regulator, and this Part will use it as a case study.

The practice of HFT is widely discussed but rarely defined with any precision: this Article shall use the term HFT to denote “fully automated trading strategies with very high trading volume and extremely short holding periods ranging from milliseconds to minutes,”¹²⁴ but recognizes that this is an umbrella description that covers many varied—and constantly evolving—trading strategies.¹²⁵ One uniting feature of these strategies is that “HFT firms profit mostly from small price changes and by small but frequent trades executed. The strong focus on speed of execution and portfolio turnover are probably the key characteristics that distinguish HFT from other types of algorithmic trading.”¹²⁶ HFT is a subset of algorithmic trading, meaning that trading is executed according to instructions generated by a preset computer algorithm.¹²⁷ Many types of HFT not only rely on algorithms to execute trades, but also use them to identify and evaluate trading opportunities.¹²⁸ For example, algorithms may scour the internet for news of potentially market-moving events, seek to detect cloaked large trades to trade ahead of, or deploy more complicated formulae and data sets to identify mispriced stocks and execute arbitrage trades.¹²⁹ HFT firms tend to jealously guard the confidentiality of their trading algorithms.¹³⁰

Like any new practice that has disrupted an existing market infrastructure, HFT has both its proponents and detractors. Its proponents cite lowered costs, greater speed, and increased liquidity as the benefits of high frequency trading¹³¹ (in particular, advocates note that HFT has lowered bid-ask spreads),¹³² and the data do indeed suggest that execution speed and cost for trades have decreased as the volume of HFT has increased.¹³³ Many also credit HFT with improving market efficiency by increasing the speed with

ORGANIZATION OF SECURITIES COMMISSIONS, REGULATORY ISSUES RAISED BY THE IMPACT OF TECHNOLOGICAL CHANGES IN MARKET INTEGRITY AND EFFICIENCY: FINAL REPORT 20 (Oct. 2011) [hereinafter “IOSCO HFT REPORT”].

123. Gerig, *supra* note 4.

124. X. Frank Zhang, High-Frequency Trading, Stock Volatility, and Price Discovery 1 (Dec. 2010) (unpublished manuscript), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1691679.

125. IOSCO HFT REPORT, *supra* note 122, at 24.

126. *Id.* at 23.

127. *Id.* at 11.

128. *Id.* at 22–23.

129. Brummer, *supra* note 33, at 1002; Merritt B. Fox et al., *The New Stock Market: Sense and Nonsense*, 65 DUKE L.J. 191, 202–203 (2015).

130. Zachary Warmbrodt, *The Mystery of High-Frequency Trading*, POLITICO (Sept. 28, 2016), <http://www.politico.com/agenda/story/2016/09/algorithmic-high-frequency-stock-market-trading-000208>.

131. DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 16.

132. *When Improving Markets, First Do No Harm*, MOD. MKTS. INITIATIVE (July 10, 2014), <http://modernmarketsinitiative.org/07/2014/improving-markets-do-no-harm>.

133. IOSCO HFT REPORT, *supra* note 122, at 10; DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 166.

which information is impounded into securities' prices,¹³⁴ and (through arbitrage strategies) facilitating price discovery across fragmented markets.¹³⁵ Detractors often cite concerns about fairness, the integrity of the markets, and the quality of the liquidity provided by HFT (from a financial stability perspective, liquidity is only really valuable if it is reliably available).¹³⁶

This Article does not take a position on whether the rise of HFT is, on balance, a good or bad development for our equity markets. Ultimately, many of the touted benefits and costs of HFT are empirical claims, and to date, many of the studies that have sought to verify these claims and quantify the impact of the advent of HFT have generated inconsistent results.¹³⁷ In time, a consensus position may emerge from these studies, but the SEC should exercise caution when reviewing studies that rely on historical data:¹³⁸ much of the research generated on HFT is likely to focus on normal times, and downplay (or even ignore entirely) low probability events that may dramatically impact the equities markets if and when they do occur.¹³⁹ For example, a number of significant glitches have roiled the equities markets in recent years. The most infamous of these was the so-called "Flash Crash" of May 6, 2010.

According to a joint report by the SEC and CFTC, the Flash Crash was triggered by a mutual fund firm using a trading algorithm to release \$4.1 billion of stock futures into the markets within the space of 20 minutes.¹⁴⁰ As soon as some of the stock futures were purchased, the mutual fund's algorithm would direct it to sell more, but the algorithm failed to note that many of the purchasers of these stock futures were high-frequency traders, who turned around and sold the futures almost immediately. As such, the mutual fund's algorithm was selling when its previous sales had not yet been properly absorbed into the market¹⁴¹—the resulting volatility ensured that many longer-term buyers held off from purchasing the stock futures¹⁴² and as a result, the stock futures were simply bouncing

134. MOD. MKTS. INITIATIVE, *supra* note 132.

135. *Id.*

136. *See infra* Parts V.A–C.

137. STAFF OF THE DIV. OF TRADING AND MARKETS, SEC, EQUITY MARKET STRUCTURE LITERATURE REVIEW; PART II; HIGH FREQUENCY TRADING 10–11 (Mar. 18, 2014), https://www.sec.gov/marketstructure/research/hft_lit_review_march_2014.pdf. IOSCO HFT REPORT, *supra* note 122, at 25–26. Part of the problem is that "high frequency trading" describes so many varied trading practices, and another part of the problem is that HFT has come to prominence during a period when financial markets have been roiled by crises, and affected by regulatory reforms implemented in reaction to such crises. As such, it is difficult to isolate the variables that pertain solely to the increasing adoption of HFT strategies.

138. The SEC has committed itself to using a data-driven approach to evaluate these claims as it formulates new rules for market structure reform. Mary Jo White, Chair, SEC, Speech at the Sandler O'Neill & Partners, L.P. Global Exchange and Brokerage Conference: Enhancing Our Equity Market Structure (June 5, 2014), <https://www.sec.gov/News/Speech/Detail/Speech/1370542004312> [hereinafter White, Enhancing Our Equity Market].

139. One rare exception is Pankaj Jain et al., *Does High-Frequency Trading Increase Systemic Risk?*, 31 J. FIN. MKTS. 1 (2016). "By focusing on the tails, we are able to highlight that whereas prior findings about [HFT]'s contribution to market quality discussed at the beginning of this introduction are applicable in most normal periods, special attention is required to deal with the adverse impact of [HFT] during tail events." *Id.* at 3.

140. CFTC & SEC, FINDINGS REGARDING THE MARKET EVENTS OF MAY 6, 2010, at 2 (Sept. 30, 2010), <http://www.sec.gov/news/studies/2010/marketevents-report.pdf> (hereinafter FLASH CRASH REPORT).

141. *Id.* at 3.

142. "This sudden decline in both price and liquidity may be symptomatic of the notion that prices were moving so fast, fundamental buyers and cross-market arbitrageurs were either unable or unwilling to supply enough buy-side liquidity." *Id.* at 4.

around amongst the high-frequency traders.¹⁴³ Without real buyers, prices of the futures fell by more than five percent in under five minutes, until the Chicago Mercantile Exchange briefly halted trading in the futures.¹⁴⁴ Problems with trading these stock futures then infected the trading of the underlying equity securities,¹⁴⁵ and the combined effect of this activity was to cause major equity indices like the Dow Jones Industrial Average to plummet five to six percent in a matter of minutes.¹⁴⁶ The SEC/CFTC report on the Flash Crash concluded that “under stressed market conditions, the automated execution of a large sell order can trigger extreme price movements, especially if the automated execution algorithm does not take prices into account. Moreover, the interaction between automated execution programs and algorithmic trading strategies can quickly erode liquidity and result in disorderly markets.”¹⁴⁷

Although the Flash Crash remains the most significant market glitch in recent years, it was not the last. The HFT firm Knight Capital suffered \$460 million in losses in 2012 as the result of a computer glitch, and ultimately had to be acquired by a competitor.¹⁴⁸ There was also a so-called “treasury flash crash” in October of 2014 that affected the price of U.S. Treasury bonds,¹⁴⁹ and a number of so-called “mini flash crashes,” where “[i]ndividual stocks [including Walmart and Google] at times gyrate[d] wildly within fractions of a second, only to reset moments later.”¹⁵⁰ Some staff at the SEC have concluded that these mini crashes are caused by human “fat-finger” errors, rather than “by proprietary, high-speed algorithms, by robots gone wild, or by excessive order

143. *Id.* at 3.

144. *Id.* at 4.

145. FLASH CRASH REPORT, *supra* note 140, at 4–6.

146. Henry T.C. Hu, *Too Complex to Depict? Innovation, “Pure Information,” and the SEC Disclosure Paradigm*, 90 TEX. L. REV. 1601, 1703 (2012).

147. FLASH CRASH REPORT, *supra* note 140, at 6. The Flash Crash Report did not suggest that any market manipulation had precipitated the event, but since that report was released, the extradition of British national Navinder Singh Sarao has been ordered to the United States, in order for him to stand trial for “spoofing” that allegedly contributed (albeit in a relatively minor way) to the occurrence of the Flash Crash.

Prosecutors in the United States have accused Mr. Sarao of entering and withdrawing thousands of orders worth tens of millions of dollars each on hundreds of trading days, in an attempt to push down the price of futures contracts tied to the value of the Standard & Poor’s 500-stock index, a practice known as spoofing. Chad Bray, *Judge Orders Extradition to U.S. in ‘Flash Crash’ Case*, N.Y. TIMES (Mar. 23, 2016), <https://www.nytimes.com/2016/03/24/business/dealbook/judge-orders-extradition-to-us-in-flash-crash-case.html>. *Id.*

148. Knight Capital’s woes were occasioned by a computer glitch on August 1, 2012 that “led the firm’s computers to rapidly buy and sell millions of shares in over a hundred stocks for about 45 minutes after the markets opened. Those trades pushed the value of many stocks up, and the company’s losses appear to have occurred when it had to sell the overvalued shares back into the market at a lower price.” Nathaniel Popper, *Knight Capital Says Trading Glitch Cost it \$440 Million*, N.Y. TIMES (Aug. 2, 2012), <https://dealbook.nytimes.com/2012/08/02/knight-capital-says-trading-mishap-cost-it-440-million>. Knight Capital suffered \$460 million in losses, threatening the stability of the firm, and by December of 2012, Knight Capital had agreed to let itself be sold to Getco, leading to further consolidation of the HFT industry. Nathaniel Popper, *High-Speed Trading Giants to Merge*, N.Y. TIMES (Dec. 20, 2012), <http://www.nytimes.com/2012/12/20/business/knight-capital-announces-sale-to-getco.html>.

149. Matt Levine, *Algorithms Had Themselves a Treasury Flash Crash*, BLOOMBERG (July 13, 2015, 5:26 PM), <https://www.bloomberg.com/view/articles/2015-07-13/algorithms-had-themselves-a-treasury-flash-crash>.

150. Kara M. Stein, Comm’r, SEC, Remarks before Trader Forum 2014 Equity Trading Summit (Feb. 6, 2014), <https://www.sec.gov/News/Speech/Detail/Speech/1370540761194>.

cancellations,”¹⁵¹ but this is not necessarily comforting—even if HFT algorithms are not the ultimate cause of market disruption, they can nonetheless act as a transmission belt,¹⁵² and while none of these crashes or mini crashes has had a broad systemic impact to date, there is a concern that similar incidents could precipitate a crisis in the future. This Part will explore in more detail the problems that the practice of HFT poses for financial stability, but it will first consider how the rise of HFT impacts the more conventional SEC missions of promoting investor protection and capital formation.

A. High Frequency Trading and Investor Protection

Despite the ubiquity of the term, there has been little academic discussion about what investor protection actually *means*. To help fill this void, Guttentag has identified four different types of problems that the SEC seeks to address in order to protect investors: “(1) fraud; (2) an unlevel informational playing field; (3) the extraction of private benefits from the firm by firm insiders [sometimes referred to as ‘tunneling’]; and (4) investors’ propensity to make unwise investment decisions.”¹⁵³ Michael Lewis’ popular book “Flash Boys” brought to wide public attention the advantages that high frequency traders have over other investors in terms of access to information and speed of execution,¹⁵⁴ focusing on the “unlevel informational playing field” of investor protection (although there are also concerns that HFT will create new opportunities for market-manipulation and fraud).¹⁵⁵ As one author commented, firms with “access to information about the flow or orders and price changes just a few seconds before others” are able to trade upon that information when others are not, conferring an informational advantage on those firms.¹⁵⁶ “A few seconds” may be overstating the time periods involved: HFT firms now seek to have millisecond or even microsecond advantages over their competitors by physically locating their computers close to the trading infrastructure (known as co-location)¹⁵⁷ so that they

151. Gregg E. Berman, Assoc. Dir., Off. Analytics and Research, SEC Div. of Trading and Mkts., Transformational Technologies, Market Structure, and the SEC, Speech at the SIFMA TECH Conference (Jun. 18, 2013),

<https://www.sec.gov/News/Speech/Detail/Speech/1365171575716> [hereinafter Berman, Transformational Technologies].

152. IOSCO Systemic Risk Report, *supra* note 25, at 22.

153. Guttentag, *supra* note 69, at 210.

154. MICHAEL LEWIS, FLASH BOYS: A WALL STREET REVOLT (2014).

155. DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 170.

Algorithmic traders may also engage in tactics that resemble traditional market manipulation. For example, ‘momentum ignition’ entails the placement of a series of orders or execution of a series of trades in order to ‘ignite’ a rapid but artificial price movement. ‘Spoofing’ or ‘layering’ strategies may display and immediately cancel limit orders in order to trigger another trader’s algorithms into trading more aggressively. Other strategies, such as ‘quote stuffing’ may simply seek to sow confusion by flooding a market center with a barrage of market data messages and taking advantage of traders caught in the chaos. *Id.*

156. Peter J. Henning, *Market Changes May Prompt a New Definition of Insider Trading*, N.Y. TIMES (Nov. 4, 2015), <https://www.nytimes.com/2015/11/05/business/dealbook/market-changes-may-prompt-new-definition-of-insider-trading.html>.

157. “Co-location services exist to house trading systems used by market participants (and potentially other parties, such as data vendors) in a location close to trading venue servers. Such services are generally provided by a trading venue, whether within its data centre or in a location of close physical proximity. By providing co-located firms with the shortest available physical distance to the trading venue’s systems, co-location offers the

are the first to receive information from, and submit their orders to, such infrastructure.¹⁵⁸ Without expensive real estate and extensive computing power, other traders (even large institutional investors) are at a permanent disadvantage.¹⁵⁹ Although these advantages may only allow high frequency traders to recoup fractions of a cent per trade, these fractions of a cent can add up to a significant amount of profit when a high volume of trades are consummated.¹⁶⁰

Lewis is not the only one to have critiqued the informational advantages obtained by high frequency traders through their superior computer equipment and geographical location.¹⁶¹ Some commentators are less concerned, though, pointing out that some degree of informational disparity has always existed between different types of investors (even in the days when information was communicated by carrier pigeon or telegraph).¹⁶² It is also true that the majority of the trading counterparties complaining of the unlevel informational playing field are sophisticated institutional investors, rather than the more vulnerable retail investors that the SEC typically champions.¹⁶³ To the extent that retail investors are harmed by such informational asymmetries, it would typically be indirect, as a result of their investing through institutional investor intermediaries.¹⁶⁴ However, even the mere *perception* that HFT has made the equities markets less fair than in the past can be damaging to the confidence of both retail and institutional investors¹⁶⁵—a point which is also relevant to the following Parts' discussion of capital formation and financial stability.

Potential harms to investors posed by HFT may also be subtler than concerns about "rigged markets". Yadav has examined in detail how the rise in HFT undermines the economic theories on which much of the securities laws' investor protection regime, as well as its promotion of capital formation, as discussed in the next Part, is predicated. Relevantly, the "anti-tunneling" aspect of investor protection identified by Guttentag assumes that investors are protected from bad decisions, rent seeking and lazy behavior by securities issuers because of the market discipline exerted by a change in a security's price; a low price invites shareholder activism or takeover attempts which may result in the issuer's managers losing their jobs, or reducing the value of their stock-linked compensation.¹⁶⁶ To the extent that a drop in share price acts as a form of market discipline on the issuer of that share, the dissemination of information that precipitates that drop works as a form of investor protection, and if information ceases to be efficiently

advantage of extremely low latency, an essential ingredient in certain trading strategies typically used by high frequency traders and other firms wanting high speed access to the markets." IOSCO HFT REPORT, *supra* note 122, at 17.

158. DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 16.

159. HAL S. SCOTT & ANNA GELPERN, INTERNATIONAL FINANCE: TRANSACTIONS, POLICY, AND REGULATION 905 (2012).

160. IOSCO HFT REPORT, *supra* note 122, at 23.

161. DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 16.

162. Markham, *supra* note 108, at 567–81.

163. For a discussion of retail and institutional investors, see Langevoort, *Retail Investors*, *supra* note 38, at 1025. Langevoort notes that "throughout the SEC's history and culture, the rhetorical stress has been on the plight of average investors, ones who lack investing experience and sophistication so as to need the protection of the securities laws." *Id.*

164. *Id.* at 1030.

165. Tamar Frankel, *Regulation and Investors' Trust in the Securities Markets*, 68 BROOK. L. REV. 439, 444 (2002).

166. Yadav, *Algorithmic Trading*, *supra* note 120, at 1616.

impounded into the price of equity securities, then investor protection suffers.¹⁶⁷ There is at least anecdotal evidence that some institutional investors have been discouraged from participating in the equities markets because they feel outmatched by high frequency traders¹⁶⁸—informed traders who would otherwise bring their judgment of the issuer’s fundamentals to bear, and thus protect investors from “tunneling” by the issuer’s management.¹⁶⁹

B. High Frequency Trading and Capital Formation

The crowding out of informed traders, and resulting erosion of the reliability of price signals, also poses a problem for capital formation.¹⁷⁰ “When investors can easily understand what securities are worth, they can invest their capital in those enterprises that are likely to use it most productively and profitably,”¹⁷¹ but if prices become less likely to reflect the trading decisions of investors with information about the fundamental value of the issuer, capital is less likely to be allocated on the basis of fundamental expectations of long-term growth.¹⁷² After all, when the intention is only to hold a share for a fraction of a second, there is little incentive for high frequency traders to invest in determining the likely long-term trajectory of the issuer of that share.¹⁷³ Instead, in markets where HFT dominates, prices are more likely to be a reflection of algorithms’ responses to short-term market movements. As Haldane notes, “[w]ith a large fraction of momentum traders, prices deviate persistently from fundamentals. Among untested investors, momentum strategies now flourish while long-term fundamentalists fail. The speculative balance of investors rises, increasing the degree of misalignment in prices.”¹⁷⁴

Capital formation also requires liquidity—without a robust market for buying and selling equity securities, it will be harder for capital to flow to end users. HFT certainly seems to increase some measures of liquidity, in terms of lowering transaction costs and increasing the volume of equities posted for trading.¹⁷⁵ However, there are arguments about the *quality* of the liquidity provided by high frequency traders. Many of the orders submitted by such traders are submitted to elicit information about market movements or to influence market prices, without any intention of consummating said orders.¹⁷⁶

167. *Id.* at 1638. See also DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 24 (noting that where information is not easily accessible, trading is less likely to direct capital to its best uses).

168. IOSCO HFT REPORT, *supra* note 122, at 11. For a thorough explanation of this phenomenon, see Fox et al., *supra* note 129, at 231, 234.

169. “Losing out over time to high-speed algorithmic traders, fundamental traders can see fewer incentives to invest deeply in long-term research and investment. Importantly, lower gains from research can also diminish the motivation of fundamental traders to engage in governance of capital markets, for example, in shareholder monitoring.” Yadav, *Algorithmic Trading*, *supra* note 120, at 1644. See also IOSCO HFT REPORT, *supra* note 122, at 13.

170. Yadav, *Algorithmic Trading*, *supra* note 120, at 1656, 1659–63.

171. *Id.* at 1631–32.

172. Fox et al., *supra* note 129, at 234; Pasquale, *supra* note 97, at 2087.

173. As Dombalagian notes, “high-frequency traders do not necessarily hold sufficient capital to maintain positions in a financial instrument for an extended period of time; as a result their trading interest is often ephemeral.” DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 168.

174. Andrew Haldane, Exec. Dir., Bank of Eng., Patience and Finance: Speech at the Oxford China Business Forum (Sept. 9, 2010), <http://www.bis.org/review/r100909e.pdf>.

175. IOSCO HFT REPORT, *supra* note 122, at 26.

176. Peter J. Henning, *Market Changes May Prompt a New Definition of Insider Trading*, N.Y. TIMES

Significant numbers of orders are cancelled before any trade can be executed,¹⁷⁷ and cancelled orders provide no real liquidity to other market participants. There are also some who argue that even the provision of genuine liquidity by high frequency traders can be problematic, given that such liquidity encourages more high frequency traders to enter the market; it is much easier to deploy HFT strategies in a market that is awash in liquidity.¹⁷⁸ It is therefore possible that increased liquidity will increase the risk that longer-term informed traders will be crowded out of the equities markets by swarms of high frequency traders. As such, even when the equities markets are functioning normally, there are some problems associated with the liquidity that HFT provides. As the next Part will explore, from a financial stability perspective, the greater concern with HFT is that there is no guarantee that high frequency traders will continue to provide liquidity to the equities markets in times of market stress.¹⁷⁹

C. High Frequency Trading and Financial Stability

A number of high-profile episodes—most infamously, the Flash Crash of 2010—have drawn attention to the threats that HFT may pose for financial stability.¹⁸⁰ While none of the market disruptions to date has had a broad systemic impact, many are concerned that similar incidents could precipitate a full-blown crisis in the future.¹⁸¹ Notably, in April 2015, a group of senior financial regulators from the United States, Canada, Japan, and Europe issued a report that very clearly voiced concerns about the impact of HFT on financial stability: they noted that “[t]he complexity of market interactions among HFT firms and other market participants increases the potential for systemic risk to propagate

(Nov. 4, 2015).

177. IOSCO HFT REPORT, *supra* note 122, at 22.

178. Haldane, *supra* note 174.

179. Mary L. Schapiro, Chairman, SEC, Strengthening Our Equity Market Structure, Speech at the Economic Club of New York (Sept. 7, 2010), <https://www.sec.gov/news/speech/2010/spch090710mls.htm> [hereinafter Schapiro, Strengthening Our Equity].

In the old manual market structure, the market participants with the best access to the markets—the specialists on the dominant exchanges—were subject to significant trading obligations that were designed to promote fair and orderly markets and fair treatment of investors. These included affirmative obligations to provide liquidity and to promote price continuity, as well as negative obligations to forego trading in ways that would exacerbate price moves — such as aggressively taking out bids during a price decline and thereby driving prices even lower. *Id.*

See also DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 166.

180. See *supra* text accompanying notes 140–150. For a more general discussion of SEC regulation being spurred by crises, see Paredes, *supra* note 80, at 977.

181. Bruno Biais & Paul Woolley, *The Flip Side: High Frequency Trading*, FIN. WORLD, Feb. 2012, at 34, 35.

[A]lgorithmic trades tend to be correlated, suggesting that the HFT strategies used in the market are not as diverse as those used by human traders. In this context, shocks hitting the small number of very active algorithmic traders might affect the entire market. And, because high frequency trading firms are often very lightly capitalized, this could generate failures. Handling the corresponding counterparty risk could be daunting, given that HFT firms turn over their positions many times a day, while clearing systems operate at a much lower frequency. Combined, these elements could generate systemic market disruptions. *Id.*

See also Tom C.W. Lin, *The New Investor*, 60 UCLA L. REV. 678, 706 (2013) (noting how experts fear it’s “only a matter of time before” a big crisis).

across venues and asset classes over very short periods of time.”¹⁸² They also noted that “[a]n error at a relatively small algorithmic trading firm may cascade through the market, resulting in a sizable impact on the financial markets through direct errors or the reactions of other algorithms to the error.”¹⁸³ In other words, HFT has the potential to both generate and transmit shocks through the financial system.

HFT algorithms are often based on similar assumptions, and thus often react to market events in a herd-like fashion.¹⁸⁴ In addition, many algorithms are designed to react to other algorithms in order to “anticipate how their own trading impacts the trading of other players and to adapt their trading to reflect consequential price changes,” amplifying the impact of any market event.¹⁸⁵ These algorithms thus build rigid feedback loops and tight coupling into the financial system, with the result that a shock can be transmitted quickly through the equities markets and disrupt pricing and liquidity in other parts of the financial system in short order.¹⁸⁶

When HFT algorithms are programmed to trade equity securities, those trades will necessarily impact the price of those securities, and other market participants will react to that price with further trades.¹⁸⁷ As such, if a glitch in an HFT firm’s algorithm caused it to keep selling a particular equity security on a continuous basis and other algorithms followed suit, then the price of that equity security could fall dramatically. Of course, the price could certainly rebound quickly to a more reasonable range—as happened during the Flash Crash¹⁸⁸—but it is also possible that the price could remain low for a more prolonged period of time,¹⁸⁹ with the result that highly-leveraged financial institutions with exposure to the depressed equity securities would need to sell assets quickly.¹⁹⁰ Such an outcome would be exacerbated by the Value-at-Risk (VAR) models that many financial institutions rely on to assess the risks associated with their investment portfolios¹⁹¹—and which

182. *Algorithmic Trading Briefing Note*, SENIOR SUPERVISORS GROUP 1 (Apr. 2015), <https://www.newyorkfed.org/medialibrary/media/newsevents/news/banking/2015/SSG-algorithmic-trading-2015.pdf>.

183. *Id.* at 2.

184. Yadav, *Algorithmic Trading*, *supra* note 120, at 1622.

185. *Id.* at 1620.

186. IOSCO Systemic Risk Report, *supra* note 25, at 25.

A process is said to be “tightly coupled” if it moves from one stage to another with little opportunity for intervention Tight coupling can occur when automated processes are used in trading. Trading algorithms can create feedback loops when they respond to changes in the price of a security that were initiated by the algorithm or another trader. *Id.*

187. For a thorough discussion of the market participants involved in high frequency trading and its impact on stock prices, see Fox et al., *supra* note 129.

188. The market turmoil started at approximately 2:40 p.m., and “[b]y approximately 3:00 p.m., most securities had reverted back to trading at prices reflecting true consensus values.” FLASH CRASH REPORT, *supra* note 140, at 6.

189. To the author’s knowledge, there is no definitive empirical work on how frequently financial institutions adjust their asset portfolios in response to prompts from their internal risk models, but it is likely to be multiple times a day—meaning that a pricing anomaly that endured for a few hours would have the potential to trigger a systemic impact.

190. “As different managers experience similar effects, they are likely to react in the same way by each selling assets, causing greater price volatility and prompting further sales. The result is a cascading decline in value, with greater coordination impairing each firm’s ability to manage its own risk exposure.” Charles K. Whitehead, *Destructive Coordination*, 96 CORNELL L. REV. 323, 326–27 (2011).

191. VaR models generate a dollar figure that represents how much a financial institution stands to lose on

constantly prompt those institutions to offload assets as prices decline.¹⁹² The assets to be sold would not necessarily be equities—highly-leveraged institutions might prefer to reduce their leverage by selling other types of assets. If multiple institutions react in a similar way, the result will be depressed prices in a number of different asset classes. These further depressed prices might force other institutions to deleverage, creating a vicious cycle.¹⁹³

Problems with individual stock prices could also be transmitted to different asset classes in other ways. For example, some HFT algorithms are programmed to trade in response to perceived discrepancies between the prices of linked asset classes (for instance, between the prices of stock in a corporation and a futures contract referencing that stock). If enough HFT firms are using similar arbitrage strategies, then problems relating to one asset class will affect trading of the linked asset class.¹⁹⁴ In addition, many financial instruments—like ETFs—rely on stock indices as a basis for their pricing;¹⁹⁵ problems in the equities markets can impact the ability of indices to be calculated properly, and thus impact the liquidity of the products that rely on such indices for their pricing.¹⁹⁶ Stocks also serve as reference obligations for options and other derivative contracts; a problem with equities pricing will impact the value of those contracts for the counterparties thereto.¹⁹⁷ At the extreme, if asset pricing across the financial system is severely compromised, then that can lead to the insolvency of financial institutions, which will impact the availability of credit and payments processing for participants in the broader economy.¹⁹⁸

Ultimately, the potential impact of an HFT algorithm on the broader financial system will vary depending on the type of trading strategy being deployed, but the most obvious problem with most forms of HFT is speed—automated trades can happen too quickly for market participants to pull back or for regulators to intervene, even when the stock prices quoted are clearly erroneous.¹⁹⁹ While humans are certainly involved in programming HFT

its investments on any given day, within a predefined confidence level. Notwithstanding the limitations of the predictive capacity of VaR models, they are widely used. See Peter Conti-Brown, *A Proposed Fat-Tail Risk Metric: Disclosures, Derivatives and the Measurement of Financial Risk*, 87 WASH. U. L. REV. 1461, 1461–62 (2009).

192. Adrian and Shin have found that “for financial intermediaries, their models of risk and economic capital dictate active management of their overall Value-at-Risk (VaR) through adjustments of their balance sheets.” Tobias Adrian & Hyun Song Shin, *Liquidity and Leverage*, 19 J. FIN. INTERMEDIATION 418 (2010).

193. Markus K. Brunnermeier, *Deciphering the Liquidity and Credit Crunch 2007–2008*, 23 J. ECON. PERSP. 77, 94 (2009).

194. This is what happened during the Flash Crash: problems with futures trading ultimately impacted trading in equities. See *supra* notes 140–147 and accompanying text (explaining declines in price and liquidity and analyzing the cause).

195. “[S]ince ETFs are comprised of a basket of individual stocks, large moves in one or two stocks can trigger pauses in automated ETF trading systems as the integrity of those prices are checked.” *Oversight of the U.S. Securities and Exchange Commission: Evaluating Present Reforms and Future Challenges: Hearing before the S. Comm. on Capital Mkts., Insurance, and Gov’t Sponsored Enters.*, 111th Cong. (2010) (testimony of Mary L. Schapiro, Chairman, SEC).

196. DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 6.

197. *Id.* at 170–71.

198. Hilary J. Allen, *The Pathologies of Banking Business as Usual*, 17 U. PA. J. BUS. L. 861, 873–74 (2015).

199. “[F]inancial technology . . . must also contend with Murphy’s Law, ‘whatever can go wrong will go wrong,’ as well as its technology-specific corollary, ‘whatever can go wrong will go wrong faster and bigger when computers are involved.’” Andrei A. Kirilenko & Andrew W. Lo, *Moore’s Law versus Murphy’s Law: Algorithmic Trading and Its Discontents*, 27 J. ECON. PERSP. 51, 52 (2013).

algorithms, once the algorithm has been set, the trading is self-executing—there is no time to apply human judgment to individual decisions about whether to trade or not.²⁰⁰ Although one new exchange has built some delay into the trading process (to help address investor protection concerns arising from the unlevel informational playing field), its delay of 350 microseconds is insufficient to allow the exercise of human judgment—and therefore, would not address financial stability concerns.²⁰¹

Before trading was so fully automated, human judgment acted as something of a circuit-breaker,²⁰² halting trading when prices were clearly awry—as one journalist put it “None of that [i.e. the Flash Crash] would have happened back in 1987. Then there were people involved.”²⁰³ Now, the market is comprised of potentially fraught interactions between humans and algorithms.²⁰⁴ Reports of news events that are clearly erroneous—maybe even items in satirical internet publications²⁰⁵—can impact trading because algorithms have neither the time nor the ability to exercise judgment as to whether news is legitimate.²⁰⁶ Human traders who *do* have the ability to filter such information will nonetheless react to price movements effected by algorithmic trades, responding to such information. As happened during the Flash Crash, human traders may withdraw from the markets if unusual market movements cause them to fear “the occurrence of a cataclysmic event of which they were not yet aware.”²⁰⁷

The Bundesbank has found that once certain levels of market volatility are reached, HFT algorithms are also likely to withdraw from the markets:²⁰⁸ many such algorithms

200. “Computers often exclusively execute these complex formulas without any human interference after the initial installation.” Lin, *supra* note 181, at 689.

201. For a discussion of the IEX exchange and its mandated latency, see Yesha Yadav, *Insider Trading and Market Structure*, 63 UCLA L. REV. 968, 1029 (2016).

202. Fox et al., *supra* note 129, at 248. As to the necessity for human judgment in trading, see Dombalagian, *Preserving Human Agency*, *supra* note 66, at 78.

203. Floyd Norris, *In Markets’ Tuned-Up Machinery, Stubborn Ghosts Remain*, N.Y. TIMES (Aug. 22, 2013, 8:38 PM), https://dealbook.nytimes.com/2013/08/22/in-markets-tuned-up-machinery-stubborn-ghosts-remain/?rref=collection%2Fbyline%2Ffloyd-norris&action=click&contentCollection=undefined®ion=stream&module=stream_unit&version=latest&contentPlacement=159&pgtype=collection.

204. Data is not yet available as to “basic empirical facts such as the relative proportions of trading for which human beings and algorithms are responsible.” Donald MacKenzie, *A Sociology of Algorithms: High-Frequency Trading and the Shaping of Markets*, U. EDINBURGH SCH. SOC. & POL. SCI. 2 (June 2014), http://www.sps.ed.ac.uk/_data/assets/pdf_file/0004/156298/Algorithms25.pdf.

205. For example, on April 1, 2015, a “[t]esla press release jokingly announced a new ‘W’ model for a watch. It was clearly intended as a joke. However, it was taken all too seriously by computers dutifully executing their algorithms in response to the press release. The algorithms didn’t quite get the joke, trading hundreds of thousands of shares and spiking the stock price within one minute of the issuance of the release.” Kara M. Stein, Comm’r, SEC, *The Dominance of Data and the Need for New Tools: Remarks at the SIFMA Operations Conference* (Apr. 14, 2015), <https://www.sec.gov/news/speech/2015-spch041415kms.html> [hereinafter Stein, *Dominance of Data*].

206. Alina Selyukh, *Hackers send fake market-moving AP tweet on White House explosions*, REUTERS (Apr. 23, 2013, 12:31 PM), <https://www.reuters.com/article/net-us-usa-whitehouse-ap/hackers-send-fake-market-moving-ap-tweet-on-white-house-explosions-idUSBRE93M12Y20130423>.

207. FLASH CRASH REPORT, *supra* note 140, at 5.

208. “[I]n periods of heightened volatility . . . passive HFT market players, ie those that provide liquidity, typically keep a low profile by deleting trading orders, thereby reducing the supply of liquidity.” *High-Frequency Trading Can Amplify Financial Market Volatility*, DEUTSCHE BUNDESBANK (Oct. 25, 2016), https://www.bundesbank.de/Redaktion/EN/Topics/2016/2016_10_25_monthly_report_october_high_frequency_trading.html.

lack instructions for how to address low-probability tail events other than to simply cease trading.²⁰⁹ Although such an approach will help preserve the solvency of individual HFT firms in times of exigency, if many high frequency traders simultaneously deploy a “kill switch” to withdraw from the markets in times of turmoil, then that will cause liquidity to evaporate.²¹⁰ Given that high frequency traders are a crucial source of market liquidity, if they exit the markets en masse, other investors will have limited opportunities to trade and may be forced to exit positions at a deep discount.²¹¹ There is therefore potential for a vicious cycle: the pricing issues that caused the turmoil are rendered even more acute by a reduction in liquidity, ensuring even more misaligned prices and a further reduction in liquidity.

The developers of trading algorithms are unlikely to address these issues of their own volition—algorithms work faster and more efficiently if there are fewer lines of code, and so attempting to cater for rare eventualities by including more lines of code slows down the algorithm and leaves the trader at a competitive disadvantage.²¹² There is little incentive for a high frequency trader to utilize slower but safer code if many of the consequences of algorithmic failure are likely to be externalized to the markets or the economy at large. Even if such incentives could somehow be addressed (or the code developer were unusually altruistic), no HFT firm would have the knowledge or ability to design an algorithm that entirely avoided systemic consequences because it would not be able to anticipate how its algorithms might interact with those of its competitors (such algorithms are kept highly confidential).²¹³ Furthermore, even a hypothetically perfect algorithm could experience operational problems involving hardware or software—glitches might also be precipitated by human error, including so-called “fat-finger errors,” such as mistyped security symbols or incorrectly specified limit prices.”²¹⁴ Or it is possible

209. “Pre-set programming constraints also mean that algorithms cannot reflect information that falls outside of the scope of their programming. This might sound obvious, but it is significant for the quality of prices that markets produce. Precisely because of their constraints, algorithms can struggle to deal with exceptional situations that fall outside of their programming—unexpected news, crashes, or anomalous trading behavior that do not fit precisely set, ex ante parameters . . . algorithms to deal with exceptional events that occur infrequently.” Yadav, *Algorithmic Trading*, *supra* note 120, at 1614.

210. DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 169.

211. “The rapid evaporation of liquidity can affect the ability of a firm to meet its financial obligations and can be a channel through which the negative effects of a trigger event can spread across securities markets and throughout the financial system.” IOSCO Systemic Risk Report, *supra* note 25, at 23–24. *See also* Brummer, *supra* note 33, at 1033; Yadav, *Algorithmic Trading*, *supra* note 120, at 1629.

212. In light of the high costs involved in developing nuanced algorithms, “it is rational for traders to build systems that deal with the worst-case scenarios, with blunt, one-size-fits-all tools that shut down activity and ensure the trader can exit the market as quickly as possible. Traders limit the private costs to themselves, though risks can shift to the market as a whole.” Yadav, *Algorithmic Trading*, *supra* note 120, at 1655.

213. Researchers who interviewed HFT firms found that such firms found that “modeling stress test scenarios to replicate events like [the Flash Crash] is a challenge.” Carol Clark & Rajeev Ranjan, *How do Proprietary Trading Firms Control the Risks of High Speed Trading?*, FED. RES. BANK OF CHI. 10 (Mar. 2012), <https://www.chicagofed.org/publications/policy-discussion-papers/2012/pdp-1>; Indeed, some HFT firms may not even have the systems in place to calculate their own enterprise wide portfolio risk. *Id.* at 5.

214. Gregg E. Berman, Assoc. Dir., Off. Analytics and Research, SEC Div. of Trading and Mkts., Address at the 12th Annual SIFMA Market Structure Conference: Market Structure: What We Know, and What We Need to Know (Sept. 21, 2011), <https://www.sec.gov/news/speech/2011/spch092111geb.pdf> [hereinafter Berman, Market Structure: What We Know]. “Human beings—in all their irrationality, impulsiveness, greed and fear—were unpredictable and thus did not interact well with computers, even though people programmed them. Unlike computers, human beings

that the sheer volume of algorithmic trades could simply overwhelm the systems of the trading venues designed to process them.²¹⁵ Any of these glitches could act as a shock that could percolate through the financial system, ultimately undermining the availability of liquidity.

Some commentators accept the possibility of the evaporation of liquidity in times of extreme volatility as an appropriate price to pay for increased efficiency when the system is running smoothly. For example, Fox et al. have argued that “[e]vents such as the Flash Crash seem bound to occur from time to time with an HFT-dominated system for providing liquidity. . . . These occasional brief moments of total collapse of liquidity do not really seem very important in terms of our touchstones for efficiency.”²¹⁶ However, if we evaluate HFT from a financial stability rather than an efficiency perspective, events such as the Flash Crash are more troubling. While it is true that liquidity was quickly restored after the Flash Crash (and other smaller glitches that have occurred to date), there is no assurance that this will always be the case. Emergency measures deployed by regulators to calm the markets following such an event may in fact exacerbate the panic or may be insufficient to staunch the lack of confidence in the pricing of equity stocks.

For example, circuit breakers, which are in place in some markets, enable regulators to temporarily halt trading to allow time for more reasoned evaluation of market movements,²¹⁷ with the hope that trading will be more rational and orderly when it resumes.²¹⁸ However, circuit breakers are by no means perfect—they are unable to contain after-hours trading, and they may not be able to suspend trading in other jurisdictions or in linked markets.²¹⁹ As one expert noted, they “often cause more problems than they solve.”²²⁰ Inability to trade on the suspended market may create a frenzy of trading elsewhere, and this other trading will likely affect prices of equities and linked financial products once trading resumes (if trading is panicked and disorderly upon resumption, that may even retrigger the circuit breaker).²²¹ There are also investor protection concerns associated with deploying circuit breakers. For example, if a circuit breaker is triggered, then investors may be trapped in positions they wish to offload.²²² Finally, traders with the quickest access to information will be the first to know when the halt in trading is ended, effectively allowing them to set a price that may be detrimental to other, longer-term

made plenty of mistakes inputting and executing orders, “upsetting the rigid computer-driven systems, which depend on precise order.” Brummer, *supra* note 33, at 1004, 1033.

215. Concept Release on Equity Market Structure, 75 Fed. Reg. 3594 (Jan. 21, 2010) (codified at 17 C.F.R. pt. 242).

216. Fox et al., *supra* note 129, at 248.

217. Currently, in the United States, “a 15-minute pause kicks in when the price of the S&P 500 index declines by 7% or more before 3:25 p.m. Another is triggered if it declines by 13% or more. If it crosses 20%, all trading is halted. If there is a 7% or 13% decline at or after 3:25 p.m., trading continues unless it reaches 20%.” Bradley Hope & Dan Strumpf, *The Problem with Circuit Breakers*, WALL ST. J. (Jan. 7, 2016), <https://www.wsj.com/articles/the-problem-with-circuit-breakers-1452205576>.

218. IOSCO HFT REPORT, *supra* note 122, at 46.

219. Market fragmentation is being exacerbated by the proliferation of alternative trading venues like dark pools. DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 173.

220. Even when a circuit breaker is not tripped, merely approaching it may exacerbate volatility because traders panic and seek to conclude their trades just in case trading is stopped. Hope & Strumpf, *supra* note 217.

221. *Id.*; Luis M. Aguilar, Comm’r, SEC, *Evolving Equity Markets Require Constant Attention* (Oct. 27, 2015), <https://www.sec.gov/news/statement/aguilar-emsac-10-2015.html> [hereinafter Aguilar, *Evolving Equity Markets*].

222. DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at 173.

investors when trading resumes.

HFT could also pose other problems for financial stability, in addition to liquidity shortages. The influx of high frequency traders into the equities markets has arguably increased aggregate uninformed demand for stocks, which may result in the failure of pricing mechanisms for stocks, potentially fuelling the asset bubbles that often serve as precursors to a crisis.²²³ In addition, given the technological and real estate advantages needed to successfully compete in the HFT space,²²⁴ it would not be surprising if there is a trend towards consolidation of trading amongst a small number of market players. Trading might also consolidate if non-HFT market participants deem the equities markets unfair because of the advantages available to high frequency traders, and either stop trading or permanently decamp to dark trading venues where HFT firms cannot see their orders.²²⁵ If either of these eventualities were to occur, then the remaining market participants in the lit equities markets would become particularly systemically important, in terms of providing liquidity. In other words, the remaining market participants could achieve “too big to fail” status, which might incentivize them to act more recklessly, knowing that government assistance would likely be forthcoming if they were on the brink of failure.²²⁶

D. The Case for Prioritizing Financial Stability

The rise of HFT thus poses challenges for all of the SEC’s mandates, and remedial actions taken to promote one mandate may ultimately end up impeding another mandate.²²⁷ In the past, investor protection has often won out as the SEC’s paramount concern.²²⁸ As former SEC Chair Mary Schapiro noted, “if there were to be a conflict between, for example, investor protection and efficient markets, the debate would be settled by asking the question I have posted on the door to my office: ‘How does it help investors?’”²²⁹ However, this Article argues that—with respect to HFT at least—when mandates seem to conflict, the SEC should prioritize financial stability over the protection of individual investors, and over short-term capital formation as well. Part V.E’s analysis of the SEC’s communications on HFT, while not conclusive on this point, raises the possibility that the SEC may have been trending in this direction during the Obama administration. This Article has already touched on the social costs associated with a financial crisis—avoiding

223. IOSCO Systemic Risk Report, *supra* note 25, at 19. For a discussion of the potentially destabilizing effects of increased demand, see Lynn A. Stout, *Are Stock Markets Costly Casinos? Disagreement, Market Failure, and Securities Regulation*, 81 VA. L. REV. 611, 679 (1995).

224. See *supra* notes 157–159 and accompanying text.

225. IOSCO HFT REPORT, *supra* note 122, at 29.

226. Hilary J. Allen, *Let’s Talk About Tax: Fixing Bank Incentives to Sabotage Stability*, 18 FORDHAM J. CORP. & FIN. L. 821, 880 (2013).

227. The relative trade-offs that HFT poses for the SEC’s goals of investor protection and capital formation have been thoroughly explored by Fox et al., *supra* note 129.

228. Guttentag, *supra* note 69, at 212.

229. Schapiro, *Corporate Secretaries and Governance Professionals*, *supra* note 77. In a similar vein, Arthur Levitt, who was SEC Chair in 1998, concluded a speech with the words, “Investor protection is our legal mandate. Investor protection is our moral responsibility. Investor protection is my top personal priority.” Arthur Levitt, Chairman, SEC, *A Question of Integrity: Promoting Investor Confidence by Fighting Insider Trading* (Feb. 27, 1998); As recently as January 2017, Mary Jo White stressed that “investor protection must be paramount.” Mary Jo White, Chairman, SEC, *The Economic Club of New York: The SEC after the Financial Crisis: Protecting Investors, Preserving Markets* (Jan. 17, 2017), <https://www.sec.gov/news/speech/the-sec-after-the-financial-crisis.html> [hereinafter White, SEC after the Financial Crisis].

these costs is in and of itself justification for prioritizing financial stability.²³⁰ But in addition, financial stability is also the best way to protect investors collectively, and promote longer-term capital formation.

Investors, as a collective group with diversified portfolios of equity securities, would suffer significantly from a systemic failure that impacts market-wide returns.²³¹ As such, regulation that seeks to promote the stability of the equity markets is salutary from both an investor protection and a financial stability perspective. However, it is possible that regulation of HFT could increase execution costs and lower execution speed during normal times, and in this respect, the SEC's goals of financial stability and investor protection could diverge in the short-term.

On a systemic scale, increased costs and lower speed could also be problematic for capital formation in the short-term, making trading more expensive and thus reducing liquidity. However, regulators should think critically about the quality of the liquidity that HFT provides: liquidity is not an end in itself. Its continuing availability (like financial stability more broadly) is a regulatory goal because it is a precondition for broader economic growth.²³² In good times, further increases in liquidity in the equities markets provide diminishing marginal returns for the broader economy.²³³ In bad times, when the markets are most in need of liquidity, there is no guarantee of the continuing availability of liquidity provided by high frequency traders.²³⁴ It has therefore been argued that

[a] somewhat higher cost for the provision of market liquidity during the more benign stages of a financial cycle might be worthwhile if it were accompanied by less volatility and stress when the cycle inevitably turned down. In fact, even if market liquidity costs are now going to be higher on average, this might be a small price to pay for a much more stable financial sector.²³⁵

The promotion of financial stability should therefore be a priority as the SEC engages in equity market structure reform—and as the next Part demonstrates, it has indeed been a priority for the reform effort so far.

E. Market Structure Reforms Related to High Frequency Trading

The SEC's latest round of market structure reform began with the 2010 Concept Release.²³⁶ This Concept Release includes a discussion of the potential risks posed to the

230. See *supra* Part III.C.

231. Allen, *Mandates and Structure*, *supra* note 73, at 1117 (citing John Armour & Jeffrey N. Gordon, *Systemic Harms and Shareholder Value*, 6 J. LEGAL ANALYSIS 35, 54 (2014)).

232. Pasquale, *supra* note 97, at 2091.

233. "[T]he benefits of market liquidity must, like the benefits of any market completion, be of declining marginal utility as more market liquidity is attained. The additional benefits deliverable, for instance, by the extra liquidity which derives from flash or algorithmic trading, exploiting price divergences present for a fraction of a second, must be of minimal value compared to the benefits from having an equity market which is reasonably liquid on a day-by-day basis." Adair Turner, *What Do Banks Do, What Should They Do and What Public Policies Are Needed to Ensure Best Results for the Real Economy?*, CASS BUS. SCH. 27 (Mar. 17, 2010), http://www.fsa.gov.uk/pubs/speeches/at_17mar10.pdf.

234. See *supra* Part V.C.

235. Dudley, *Market and Funding Liquidity*, *supra* note 28.

236. Concept Release on Equity Market Structure, 75 Fed. Reg. 3594 (Jan. 21, 2010) (codified at 17 C.F.R. pt. 242).

market system by HFT,²³⁷ and since its issuance, the SEC has finalized a number of rules that directly address market stability issues. These include Rule 15c3-5 (known as the Market Access Rule), which seeks to improve risk management systems at broker-dealers who operate, or provide direct access to, alternative trading systems (including dark pools);²³⁸ amended Rule 15c6-1(a), which shortens the settlement period for most broker-dealer transactions; Rule 13h-1, which allows for the identification and tracking of so-called “large traders”;²³⁹ and Rule 613, which aims to create a consolidated audit trail for the routing and execution of all orders submitted in NMS securities.²⁴⁰

To elaborate, the SEC release announcing the adoption of the final Market Access Rule states that “[n]ew Rule 15c3-5 is designed to ensure that broker-dealers appropriately control the risks associated with market access, so as not to jeopardize their own financial condition, that of other market participants, the integrity of trading on the securities markets, and the stability of the financial system.”²⁴¹ When amending Rule 15c6-1(a) to adopt a two day settlement cycle, the SEC noted its express intention that the change will lead to a reduction “in credit, market, and liquidity risk, and as a result, a reduction in systemic risk for U.S. market participants,” noting that these benefits “will be distributed across the financial system.”²⁴² The release relating to Rule 13h-1 notes that “[t]he large trader reporting requirements are designed to provide the Commission with a valuable source of useful data to support its investigative and enforcement activities, as well as facilitate the Commission’s ability to assess the impact of large trader activity on the securities markets, to reconstruct trading activity following periods of unusual market volatility, and to analyze significant market events for regulatory purposes.”²⁴³ While the Federal Register entry relating to the adoption of the Consolidated Audit Trail Rule (Rule 613) does not expressly refer to issues of stability or systemic risk, other SEC communications relating to the CAT make clear its potential as an important tool for stability regulation. Commissioner Stein, for example, has said:

The Flash Crash and other events in our markets demonstrate the need for CAT. Only through a consolidated audit trail can we truly know what is happening in our marketplace, with trading activity cascading across multiple trading venues and asset classes. The linkages, complexity, and fragmentation of our markets outstrip the current ability to monitor, analyze, and interpret market events. Only through CAT can we develop regulations that are truly driven by facts. Only through CAT can regulators appropriately survey our high-speed and high-volume marketplace.²⁴⁴

Perhaps the most prominent reform of market structure regulation in the past few years has been the SEC’s adoption of Regulation Systems Compliance and Integrity (SCI),²⁴⁵ to

237. *Id.* at 63.

238. Risk Management Controls for Brokers or Dealers with Market Access, 75 Fed. Reg. 69,792 (Nov. 15, 2010) (codified at 17 C.F.R. pt. 240).

239. Large Trader Reporting, 76 Fed. Reg. 46,960 (Aug. 3, 2011) (codified at 17 C.F.R. pts. 240, 249).

240. Consolidated Audit Trail, 77 Fed. Reg. 45,722 (Aug. 1, 2012) (codified at 17 C.F.R. pt. 242).

241. Risk Management Controls for Brokers or Dealers with Market Access, 75 Fed. Reg. at 69,792.

242. Securities Transaction Settlement Cycle, 82 Fed. Reg. 15,564 (Mar. 29, 2017) (codified at 17 C.F.R. pt. 240).

243. Large Trader Reporting, 76 Fed. Reg. at 46,960.

244. Stein, *Dominance of Data*, *supra* note 205.

245. Regulation Systems Compliance and Integrity, 79 Fed. Reg. 72,252 (Dec. 5, 2014) (codified at 17

“strengthen the technology infrastructure of the U.S. securities markets.”²⁴⁶ In adopting Regulation SCI as a final rule in November 2014, the SEC noted that “[s]ince Regulation SCI’s proposal in March 2013, additional systems problems among market participants have occurred, further underscoring the importance of bolstering the robustness of U.S. market infrastructure to help ensure its stability, integrity, and resiliency.”²⁴⁷ To that end, Regulation SCI imposes new compliance obligations on specified market infrastructure providers (referred to as SCI entities),²⁴⁸ including obligations to adopt policies (and regularly review and report compliance with such policies) to ensure their systems have the “capacity, integrity, resiliency, availability, and security adequate to maintain their operational capability and promote the maintenance of fair and orderly market.”²⁴⁹ SCI entities will also be required to “mandate participation by designated members or participants in scheduled testing of the operation of their business continuity and disaster recovery plans, including backup systems, and to coordinate such testing on an industry- or sector-wide basis with other SCI entities” and “take corrective action with respect to . . . systems disruptions, systems compliance issues, and systems intrusions.”²⁵⁰ In some circumstances, SCI entities will be required to notify the SEC and certain market participants of such events.²⁵¹

While Regulation SCI is by no means perfect (for example, it does not reach a significant portion of HFT activity),²⁵² it is a step that is squarely aimed at maintaining the stability and orderly functioning of the securities markets. The same is true for other recent market structure reforms that the SEC has coordinated with self-regulatory organizations like the NYSE, NASDAQ, and FINRA, including rules prohibiting “stub quotes,”²⁵³ and a so-called “limit up-limit down,” or “LULD” mechanisms, implemented to “prevent[] trades in individual exchange-listed equity securities from occurring outside of a specified price band.”²⁵⁴ In addition, following the Flash Crash, uniform circuit breakers that “halt

C.F.R. pts. 240, 242, 249).

246. SEC *Spotlight: Regulation SCI*, SEC, <https://www.sec.gov/spotlight/regulation-sci.shtml> (last visited Feb. 9, 2018).

247. Regulation Systems Compliance and Integrity, 79 Fed. Reg. at 72,254.

248. “Regulation SCI will apply to operators of certain alternative trading systems (“ATSS”), market data information providers and clearing agencies, in addition to national securities exchanges.” Annette L. Nazareth et al., *SEC Adopts Regulation SCI to Strengthen Securities Market Infrastructure*, HARV. L. SCHOL. F. CORP. GOVERNANCE & FIN. REG. (Jan. 7, 2015), <https://corpgov.law.harvard.edu/2015/01/07/sec-adopts-regulation-sci-to-strengthen-securities-market-infrastructure/>.

249. Regulation Systems Compliance and Integrity, 79 Fed. Reg. at 72,252.

250. *Id.*

251. *Id.*

252. Nazareth et al., *supra* note 248 (“[D]espite the reported urging of two Commissioners, Regulation SCI will not apply to broker-dealers operating high-volume proprietary trading platforms.”).

253. Press Release, SEC, SEC Approves New Rules Prohibiting Market Maker Stub Quotes (Nov. 8, 2010), <https://www.sec.gov/news/press/2010/2010-216.htm>.

A stub quote is an offer to buy or sell a stock at a price so far away from the prevailing market that it is not intended to be executed, such as an order to buy at a penny or an offer to sell at \$100,000 [. . .] “By prohibiting stub quotes, we are reducing the risk that trades will be executed at irrational prices, and then need to be broken, if the markets become volatile,” said SEC Chairman Mary L. Schapiro. *Id.*

254. Press Release, SEC, SEC Approves Proposals to Address Extraordinary Volatility in Individual Stocks and Broader Stock Market (Jun. 1, 2012), <https://www.sec.gov/News/PressRelease/Detail/PressRelease/1365171482422>.

trading in all exchange-listed securities throughout the U.S. markets” were updated to “lower the percentage-decline threshold for triggering a market-wide trading halt and shorten the amount of time that trading is halted.”²⁵⁵ Comments by former SEC Chair Mary Schapiro make clear that such changes were primarily prompted by concerns about volatility and market stability

[t]he initiatives we approved are the product of a significant effort to devise a sophisticated, yet workable and effective way to protect our markets from excessive volatility . . . In today’s complex electronic markets, we need an automated and appropriately calibrated way to pause or limit trading if prices move too far too fast.²⁵⁶

Since the aforementioned rules and initiatives were finalized, a number of new rules have been proposed by the SEC, but not yet adopted, that potentially lay the groundwork for future financial stability regulation. One such rule proposes revamping the regulation of alternative trading systems (including dark pools) in light of the SEC’s concerns “that the current regulatory requirements relating to operational transparency for ATSs, particularly those that execute trades in NMS stocks, may no longer fully meet the goals of furthering the public interest and protecting investors.”²⁵⁷ Another proposal has been made to limit the ability of broker-dealers to seek exemptions from requirements to belong to a registered national securities association²⁵⁸ (this proposal is intended to enhance regulatory oversight of HFT firms).²⁵⁹ Finally, the SEC has proposed a rule intended to improve disclosures made by broker-dealers regarding order routing, because

[T]he Commission preliminarily believes that the complexity of order execution algorithms and smart order routing systems, and the multiplicity of venues to which broker-dealers may route orders or send actionable indications of interest, have made it increasingly difficult for institutional customers to assess the impact particular order routing strategies may have on the quality of their executions, or the risks presented by any resulting information leakage or broker-dealer conflicts of interest.²⁶⁰

These latter three proposals do not mention financial stability or systemic risk, but by allowing for greater oversight and transparency of the equity markets, they may nonetheless lay the groundwork for future financial stability regulation by the SEC.²⁶¹

Notwithstanding the volume of rule-making to date, the SEC’s market structure reform project is still very much a work in progress. The Equity Market Structure Advisory

255. *Id.*

256. *Id.* Notably, there is no reference to investor protection or capital formation in the press release announcing the new rules.

257. Regulation of NMS Stock Alternative Trading Systems, 80 Fed. Reg. 80,998 (Dec. 28, 2015) (codified at 17 C.F.R. pts. 240, 242, 249).

258. Exemption for Certain Exchange Members, 80 Fed. Reg. 18,036 (proposed Apr. 2, 2015) (to be codified at 17 C.F.R. pt. 240).

259. Press Release, SEC, SEC Proposes Rule to Require Broker-Dealers Active in Off-Exchange Market to Become Members of National Securities Association (Mar. 25, 2015), <https://www.sec.gov/news/pressrelease/2015-48.html>.

260. Disclosure of Order Handling Information, 81 Fed. Reg. 49,432 (July 27, 2016) (codified at 17 C.F.R. pts. 240, 242).

261. *See infra* notes 321, 322 and accompanying text.

Committee, established in January 2015 to assist the SEC in addressing the more fundamental policy questions associated with market structure reform,²⁶² continues to meet and its work is ongoing (the Committee's charter has been renewed until August 2017).²⁶³ As such, the SEC can make further contributions to financial stability as it continues to engage in market structure reform.

F. SEC Communications Relating to High Frequency Trading

The purpose of this Part is to try and discern from the SEC's public communications whether the SEC is in fact considering financial stability—not in a prudential sense, or a static sense, but as such term is broadly defined in Part II—as it explores potential regulatory reforms relating to HFT. While it is true that public communications may not always convey the true motivations of SEC personnel,²⁶⁴ attempting to discern the desired public message is nevertheless a valuable undertaking that can suggest much about the SEC's current perspectives on market structure reform, and about how such reform might progress in the future. As Langevoort has noted, “[b]oth common experience and bureaucratic theory teach that organizations will often develop attachments to rhetoric, which rhetoric then becomes increasingly influential in molding the later behavior of the agency.”²⁶⁵ Put differently, the words that members of an agency choose to use in public communications matter, and may shape future agency policy, “especially in an environment characterized (as with the SEC) by rapid turnover of key personnel.”²⁶⁶

A full list of the communications reviewed can be found at Appendix A. This list includes all of the testimony, public statements and speeches by SEC commissioners and senior staff members, as well as press releases issued by the SEC, that were published between January 2010 and January 2017²⁶⁷ which not only mention HFT, but also include some substantive discussion of the practice, or market structure reform more generally.²⁶⁸ Each of the documents reviewed was manually searched for references to permutations of several rhetorically significant key phrases: “investor protection”, “capital formation” and “stability”/“systemic risk.” The words “investor protection” were chosen as keywords because they appear frequently in the securities statutes and in the SEC's own formulation of its mandate, and because SEC personnel are usually quite forthright in noting their

262. White, *Enhancing Our Equity Market*, *supra* note 138.

263. Press Release, SEC, SEC Votes to Renew Equity Market Structure Advisory Committee (Nov. 19, 2016), <https://www.sec.gov/news/pressrelease/2016-249.html>.

264. There are many interesting and valuable frames through which to examine the motivations of SEC personnel, including partisan politics, public choice theory, and behavioral economics. These frames are largely beyond the scope of this article, but for an excellent discussion of the various ways in which to analyze the internal workings of the SEC. See Langevoort, *SEC as a Lawmaker*, *supra* note 40, at 1597.

265. Langevoort, *SEC as a Bureaucracy*, *supra* note 96, at 532.

266. *Id.* at 533. As Dombalagian notes, “seasoned regulators may be inclined to rely excessively on assumptions built up through years of professional education and training”, particularly when new technologies are involved. DOMBALAGIAN, *CHASING THE TAPE*, *supra* note 76, at 33.

267. The year 2010 is not an arbitrary starting point for this exercise: the publication of the Concept Release in January 2010 marked the beginning of the SEC's latest foray into market structure issues, and interest in such issues intensified upon the occurrence of the Flash Crash in May 2010. Interest in HFT from other global regulators also picked around this same time. See IOSCO HFT REPORT, *supra* note 122, at 21–22.

268. Documents that merely speak to market turmoil or reform projects more generally were excluded from the analysis, as were documents with only a passing reference to the administrative aspects of, or budgeting for, the market structure reform project.

concerns about investor protection using those exact words.²⁶⁹ The phrase “capital formation” is similarly found in both the SEC’s self-described mission, and the securities statutes.²⁷⁰ The words “stability” and “systemic risk” were selected as these are the words generally used post-crisis to denote a regulatory focus on avoiding failure of the financial system.²⁷¹ In addition to being searched for keywords, each of the documents in Appendix A was read in its entirety to determine if, even in the absence of a particular keyword, there was any substantive discussion of issues pertaining to investor protection, capital formation or stability.

Of the 107 documents reviewed, 93 made some allusion to investor protection issues, 71 made some allusion to capital formation, and 67 made some allusion to the stability of the equities markets or the financial system as a whole.²⁷² This rough analysis indicates that investor protection continues to be a priority for the SEC as it approaches HFT, a conclusion that is aligned with the SEC’s self-conception as primarily an investor protection regulator²⁷³ (although admittedly, these communications do not generally provide much clarity as to *which* investors—retail or institutional—the SEC is focused on.) However, it is also clear that capital formation and financial stability were by no means ignored. Interestingly, mentions of capital formation and efficiency—which the SEC has a clear statutory mandate to pursue—were roughly on par with mentions of stability (which has a less solid legislative foundation as an SEC goal).²⁷⁴ Of course, noting the incidence of keywords—or incidences of substantive discussion of a topic—can only tell us so much. While such numbers can serve as a very rough proxy for the amount of attention being accorded a particular issue, it is necessary to move beyond the keywords to a more thorough reading of the documents reviewed if we wish to evaluate the depth of the SEC’s commitment to stability.

A close reading of those documents indicates that the SEC Commissioners who have identified as either Independent or Democratically-affiliated have made significant mention of “stability” in their communications regarding HFT—these commissioners also tend to include significant discussion of investor protection in their communications. During their respective tenures at the SEC, Chairs Mary Schapiro and Mary Jo White, as well as Commissioners Luis Aguilar and Kara Stein, have all demonstrated commitment to addressing stability issues when dealing with market structure reform. Illustrative quotes include the following:

- Over the past few years, all financial regulators have been faced with key issues of systemic risk and financial stability. At the SEC, our activities

269. See *supra* text accompanying notes 69–70. See also Guttentag, *supra* note 69, at 212–18, for the frequency with which such words are invoked.

270. See *supra* text accompanying note 70.

271. Allen, *What is Financial Stability*, *supra* note 1, at 933–34.

272. Of the 116 documents reviewed, 71 used a permutation of the key phrase “investor protection”, and of the 47 documents that did *not* include that phrase, 33 either mentioned concepts similar to “fairness” or included a substantive discussion of investor protection issues. 56 documents used a permutation of the words “capital formation,” and of the 63 documents that did *not* include that phrase, 20 either mentioned concepts similar to “efficiency” or included a substantive discussion of promoting capital formation. Finally, while only 41 documents used a permutation of the keywords “stability”/“systemic risk,” 30 other documents mentioned the “robustness” or “resilience” of the equities markets, or otherwise included a substantive discussion of market stability or systemic risk.

273. Langevoort, *SEC as a Lawmaker*, *supra* note 40, at 1625.

274. See *supra* Part III.B.

have included a broad-based appraisal of both the strengths and weaknesses of our current equity market structure, and our capacity to monitor trading across all trading venues and to enforce the securities laws and regulations and self-regulatory organization (SRO) rules.²⁷⁵

- We appreciate the technological changes that make markets more efficient, reduce costs, and increase liquidity. But when these changes have the potential to destabilize markets without significantly contributing to key market functions, we believe they deserve a second look.²⁷⁶
- It falls to the SEC to ensure that the rules governing market structure and market participant behavior foster fair, reliable and resilient markets that warrant the full confidence of investors and listed companies.²⁷⁷
Given their volume and access, high frequency trading firms have a tremendous capacity to affect the stability and integrity of the equity markets. Currently, however, high frequency trading firms are subject to very little in the way of obligations either to protect that stability by promoting reasonable price continuity in tough times, or to refrain from exacerbating price volatility . . . An out-of-control algorithm not only can cause serious losses to the firm that uses it, it can also cause severe trading disruptions that harm market stability and shake investor confidence.²⁷⁸
- But perhaps the strongest message from the Knight Capital episode is that the party committing an error may very well end up bearing a massive financial loss. That, more than anything, sends a wake-up call to the entire industry. Nonetheless, our concern is not whether a single firm might fail, but whether it causes collateral damage to investors and their confidence in the integrity and stability of our markets.²⁷⁹
- Regulation SCI mandates comprehensive new controls to strengthen key technological systems, promoting more transparency, resiliency and accountability.²⁸⁰
- An area of particular focus is the use of aggressive, destabilizing trading strategies in vulnerable market conditions, when they could most seriously exacerbate price volatility. While the volatility moderators already put in place impose outside limits on price moves, even moves within those limits can be damaging. Instability arising during a broad market event may simultaneously affect hundreds or thousands of stocks,

275. *Oversight of Dodd-Frank Implementation: Monitoring Systemic Risk and Promoting Financial Stability: Before the S. Comm. on Banking, Hous., and Urban Affairs*, 112th Cong. 60 (2011) (testimony of Mary L. Schapiro, Chairman, SEC).

276. Mary L. Schapiro, Chairman, SEC, Remarks at the Stanford University Law School Directors College (Jun. 20, 2010), <https://www.sec.gov/news/speech/2010/spch062010mls.htm>.

277. Schapiro, *Strengthening Our Equity*, *supra* note 179.

278. Mary L. Schapiro, Chairman, SEC, Remarks Before the Security Traders Association (Sep. 22, 2010), <https://www.sec.gov/news/speech/2010/spch092210mls.htm>.

279. Mary L. Schapiro, Chairman, SEC, Introductory Remarks at SEC's Market Technology Roundtable (Oct. 2, 2012), <https://www.sec.gov/News/Speech/Detail/Speech/1365171491354>.

280. Mary Jo White, Chair, SEC, Chairman's Address at SEC Speaks 2015 (Feb. 20, 2015), <https://www.sec.gov/news/speech/2015-spch022015mjw.html>.

triggering many trading pauses and reopenings over a short period of time.²⁸¹

- I believe that the goal of reducing systemic risk is a central tenet of the SEC's long-standing mission.²⁸²
- The proliferation of algorithmic trading has resulted in a more anonymous trading environment, where market participants may be more acutely focused on short-term gains than was the case in the past. In such circumstances, market participants may be more likely to withdraw their liquidity during periods of market stress, leaving markets more prone to severe bouts of illiquidity.²⁸³
- I am growing increasingly concerned about the stability of our market structure as we lurch from one crisis to another, be it the flash crash or the Knight trading fiasco. Today, I plan to focus on the dangers that investors face from a trading market structure that has shown too many signs of weakness and instability.²⁸⁴
- The Flash Crash and other events in our markets demonstrate the need for CAT. Only through a consolidated audit trail can we truly know what is happening in our marketplace, with trading activity cascading across multiple trading venues and asset classes. The linkages, complexity, and fragmentation of our markets outstrip the current ability to monitor, analyze, and interpret market events. Only through CAT can we develop regulations that are truly driven by facts. Only through CAT can regulators appropriately survey our high-speed and high volume marketplace.
- Despite everyone's best efforts, computers are going to fail; software is going to malfunction; and human errors will continue. "Bugs" and "glitches" cannot be fully eradicated. However, we can and should find ways to minimize the impact of these problems on our larger financial system. Technology disruptions and failures erode confidence and trust in our markets. We need to all work together to make our securities markets more reliable and resilient when such inevitable disturbances occur. Stable and reliable markets give investors around the world the confidence to invest. Those investments help our nation's businesses grow, prosper, and create jobs for millions for Americans. Those investments help Americans buy homes, save for retirement, and pay for their children's educations. When investor trust waivers, so does the well-being of our entire economy.²⁸⁵

281. White, *Enhancing Our Equity Market*, *supra* note 138.

282. White, *SEC after the Financial Crisis*, *supra* note 229.

283. Luis M. Aguilar, Comm'r, SEC, Public Statement: Ere Misery Made Me Wise - The Need to Revisit the Regulatory Framework of the U.S. Treasury Market (July 14, 2015) <https://www.sec.gov/news/statement/need-to-revisit--regulatory-framework-us-treasury-market.html>.

284. Luis M. Aguilar, Comm'r, SEC, Addressing Market Instability Through Informed and Smart Regulation, Speech at Practising Law Institute's SEC Speaks in 2013 Program, Washington, D.C. (Feb. 22, 2013), <https://www.sec.gov/news/speech/2013-spch022213laahtm> [hereinafter Aguilar, Addressing Market Instability].

285. Kara M. Stein, Comm'r, SEC, Public Statement on Regulation Systems Compliance & Integrity (SCI) (Nov. 19, 2014), <https://www.sec.gov/news/public-statement/spch111914kms>.

- We have to understand what the computers are doing in order to respond quickly and effectively to disruptions. Failure to do so can create additional risk to the financial system.²⁸⁶

Communications from Republican-affiliated former and current Commissioners, while often highly critical of the FSOC and the rhetorical term “financial stability,”²⁸⁷ nonetheless indicate something of a commitment to orderly markets and market stability. For example, former Commissioner Daniel Gallagher stated in one speech:

For the past several years, banking regulators and others have attempted to graft their systemic risk mandate on to the SEC’s own or otherwise dragoon the agency into the already broad group of systemic risk regulators. This is as unwise as it is impractical.

That being said, I believe that by faithfully carrying out our mandate to protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation in the fixed income markets, we can address some of the underlying systemic risk arising in those markets.²⁸⁸

In another speech, Commissioner Michael Piwowar indicated that market glitches should not be the sole focus of market structure reform, but implied that the orderly functioning of equity markets infrastructure is an appropriate subject for regulatory review:

A review cannot be focused narrowly on what may have caused the most recent market disruption or trading “glitch.” Instead, it is imperative that a market structure review cover a much larger scope. Topics we must consider include, but are not limited to, market infrastructure (i.e., technology and interconnectivity of market centers), the classification and treatment of different types of market participants, undisplayed liquidity, exchange pricing models, off-exchange trading, self-regulatory organization oversight, and a Regulation NMS “regulatory lookback.”²⁸⁹

The commitment of Gallagher and Piwowar to financial stability should not be overstated: their communications suggest that they prioritize efficiency and capital formation first and foremost.²⁹⁰ Nonetheless, it is a positive sign that these Commissioners have been willing to concede that SEC regulation can make some contribution to the orderly functioning of the equities markets, and thus the financial system as a whole, even though they may resist labeling such efforts as “financial stability regulation.”

Given that it has been argued that “the senior staff [of the SEC] are the real loci of policy formulation” in the agency,²⁹¹ it is also worth looking at communications from senior SEC staff members on the subject of HFT. Unsurprisingly, Andrew Ceresney, the

286. Kara M. Stein, Comm’r, SEC, Statement on the Joint Industry Plan on the Consolidated Audit Trail (“CAT”) (Nov. 15, 2016), <https://www.sec.gov/news/statement/stein-statement-open-meeting-111516.html>.

287. See *supra* notes 59–61.

288. Gallagher, Remarks to the Georgetown University Center, *supra* note 59.

289. Michael S. Piwowar, Comm’r, SEC, Speech on The Benefit of Hindsight and the Promise of Foresight: A Proposal for A Comprehensive Review of Equity Market Structure (2013), <https://www.sec.gov/news/speech/2013-spch12013msp>.

290. See, e.g., Michael S. Piwowar, Comm’r, SEC, Remarks at AEI Conference on Financial Stability (July 15, 2014), <https://www.sec.gov/news/speech/2014-spch071514msp>; Gallagher, Remarks to the Georgetown University Center, *supra* note 59; Gallagher, SEC’s Rulemaking Agenda, *supra* note 60.

291. Langevoort, *SEC as a Lawmaker*, *supra* note 40, at 1604.

SEC's former Director of Enforcement, tended to focus on investor protection issues when discussing HFT.²⁹² However, even in the context of enforcement, the subject of market stability came up. In discussing recent enforcement actions in November 2015, Ceresney noted that:

The case against Latour, and the others I mentioned, deliver important messages. First, firms with market access must have controls over their automated trading systems and, when designing those controls, have safeguards in place that anticipate mistakes and limit the harm they can cause. Second, non-fraud market structure violations can have severe consequence. ISO violations, for example, can cause other market participants who followed the law to lose executions that they otherwise might have received. And the Knight case had significant market impact beyond the effect on Knight itself.²⁹³

As might be expected, the majority of staff communications on the topic of HFT emanate from the SEC's Division of Trading and Markets. In Congressional testimony, former Director of the Division Stephen Luparello stated:

One of the most serious concerns about highly electronic markets is the risk of instability and disruption. Sophisticated technology tools can enhance efficiency, but they also can facilitate the rapid onset of a trading disruption. These disruptions can arise when systems that drive algorithmic trading fail or malfunction, and also when high-speed trading leads to sudden gaps between liquidity demand and supply that can cause extreme price volatility. Addressing the risk of instability and disruption from these two sources has been a high priority of the SEC in recent years and will continue to be a focus in 2016.²⁹⁴

Communications regarding HFT from Gregg Berman, former Associate Director of the Division of Trading and Markets, were also firmly grounded in concerns about market stability issues. His speeches about the equities markets are highly technical discussions of how such markets work, focusing on their complexities, automation and interconnectedness, and the need to prioritize continuing liquidity in such markets,²⁹⁵ but his ultimate concern seemed to be about ensuring continuing market stability. In one speech, Berman noted that, "I believe that a market structure that can support the requirements of a consolidated audit trail will necessarily be more robust and provide

292. See, e.g., Andrew Ceresney, Dir. Div. Enft, SEC, Keynote Address at Compliance Week 2014 (May 20, 2014), <https://www.sec.gov/news/speech/2014-spch052014ajc>; Andrew Ceresney, Dir. Div. Enft, SEC, Market Structure Enforcement: Looking Back and Forward: Speech at SIFMA Compliance & Legal Society New York Regional Seminar (Nov. 2, 2015), <https://www.sec.gov/news/speech/ceresney-speech-sifma-ny-regional-seminar.html> [hereinafter Ceresney, Market Structure Enforcement].

293. Ceresney, Market Structure Enforcement, *supra* note 292.

294. *Regulatory Reforms to Improve Equity Market Structure: Hearing Before the Subcomm. on Banking, Hous., & Urban Affairs*, 114th Cong. (2016) (statement of Stephen Luparello, Dir. of Div. Trading and Mkts.).

295. Gregg E. Berman, Senior Advisor to the Dir., SEC Div. of Trading & Mkts., Market Participants and the May 6 Flash Crash, Speech at the 11th Annual SIFMA Market Structure Conference (Oct. 13, 2010), <https://www.sec.gov/news/speech/2010/spch101310geb.htm> [hereinafter Berman, May 6 Flash Crash]; Berman, Market Structure: What We Know, *supra* note 214; Berman, Transformational Technologies, *supra* note 151; Gregg E. Berman, Assoc. Dir., Off. of Analytics and Research, What Drives the Complexity and Speed of our Markets?, Speech at the North American Trading Architecture Summit (Apr. 15, 2014), <https://www.sec.gov/news/speech/2014-spch041514geb>.

participants with more confidence, even during extreme events.”²⁹⁶

Berman tended to shy away from using the keywords “investor protection” and “capital formation” that are sprinkled so liberally through the other SEC communications on HFT, but other staff members of the Division of Trading and Markets deployed them more often. James Brigagliano, former Deputy Director of the Division of Trading and Markets, appears to have focused more on balancing capital formation with investor protection, rather than considering stability issues, when considering market structure reform.²⁹⁷ James Burns, another former Deputy Director of the Division, also referred to the keywords “investor protection” and “capital formation” in a speech given in February 2013, but he expressed an overriding concern with the continuing integrity of the markets, and their ability to inspire confidence in investors.²⁹⁸ Finally, one other key SEC staff member has discussed HFT on a number of occasions—Carlo di Florio, the former National Exam Program Director. His communications indicate that Di Florio was primarily concerned with unfair market practices, but he also discussed the problems of market volatility.²⁹⁹

From the foregoing analysis, it seems that many high-profile members of the SEC’s staff, as well as its Commissioners, have at least considered market stability issues as they approached market structure reform—even if financial stability was not always their number one priority. Many of the press releases issued by the SEC that mention HFT tell a similar story—press releases announcing a proposal for the consolidated audit trail,³⁰⁰ the adoption of the market access rule,³⁰¹ an international roundtable on market structure issues,³⁰² a market technology roundtable,³⁰³ enforcement actions against Knight Capital

296. See Berman, May 6 Flash Crash, *supra* note 295.

297. James A. Brigagliano, Deputy Dir., Div. of Trading and Mkts., Keynote Speech of the SIFMA Dark Pool Symposium (Jan. 21, 2010), <https://www.sec.gov/news/speech/2010/spch012110jab.htm>; James A. Brigagliano, Deputy Dir., Div. of Trading and Mkts., Keynote Speech to the National Organization of Investment Professionals (Apr. 19, 2010), <https://www.sec.gov/news/speech/2010/spch041910jab.htm>.

298. James R. Burns, Deputy Dir., Div. of Trading and Mkts., Introductory Remarks at the SEC’s Roundtable on Decimalization (Feb. 5, 2013), <https://www.sec.gov/news/speech/2013-spch020513jrb.htm>.

299. Carlo V. di Florio, Dir., Off. of Compliance Inspections and Examinations, Remarks at the 2010 NSCP National Meeting (Nov. 1, 2010), <https://www.sec.gov/news/speech/2010/spch110110cvd.htm>; Carlo V. di Florio, Remarks at the IA Watch Annual IA Compliance Best Practices Seminar (Mar. 21, 2011), <https://www.sec.gov/news/speech/2011/spch032111cvd.htm>.

300. Press Release, SEC, SEC Proposes Consolidated Audit Trail to Better Track Market Trades (May 26, 2010), <https://www.sec.gov/news/press/2010/2010-86.htm>.

301. Press Release, SEC, SEC Adopts New Rule Preventing Unfiltered Market Access (Nov. 3, 2010), <https://www.sec.gov/news/press/2010/2010-210.htm>.

302. Press Release, SEC, SEC and FSA Co-host International Roundtable on Market Structures (Oct. 14, 2011), <https://www.sec.gov/news/press/2011/2011-209.htm>.

303. Press Release, SEC, SEC to Host Market Technology Roundtable (Aug. 8, 2012), <https://www.sec.gov/news/press-release/2012-2012-153.htm>.

and Latour Capital,³⁰⁴ and a proposal for increased regulation of high frequency traders,³⁰⁵ all make at least some mention of the importance of protecting the stability of the equities markets.

That said, there has been almost complete turnover of SEC Commissioners and senior Enforcement and Trading & Markets staff with the incoming Trump administration. The majority of the Commissioners appointed by the new Trump administration could well be more ideologically aligned with the SEC's "capital formation" mandate and the end goal of efficiency, and prefer to avoid implementing any regulation that could be seen as costly for the industry, or slowing down the process of price formation and provision of liquidity by high frequency traders.³⁰⁶ However, because the costs of financial crises—both quantifiable monetary costs as well as more diffuse social costs—are so catastrophic,³⁰⁷ this Article urges incoming commissioners and staff members to emulate the SEC's approach of the last seven years, and affirm that the promotion of financial stability is one of the SEC's core functions. It was perhaps in a similar spirit of admonishment that outgoing SEC Chief Mary Jo White said, in the last speech of her tenure, "I believe that the goal of reducing systemic risk is a central tenet of the SEC's long-standing mission."³⁰⁸

VI. ADOPTING A FINANCIAL STABILITY-INFORMED APPROACH TO HIGH FREQUENCY TRADING REGULATION

As the SEC's Equity Market Structure Reform project continues, there are a number of steps the SEC could take to help mitigate the risks that HFT poses for financial stability. This Part will survey some of the proposals that have already been made to this end, as well as considering possible cutting-edge technological reforms that the SEC might avail itself of in the future. Before going any further, though, it is worth acknowledging that some of the systemic risks associated with HFT would best be addressed using prudential regulation. For example, if a technological arms race amongst HFT firms results in a much more concentrated group of "too big to fail" traders, then those firms might need to be the subject of prudential regulation that aims to prevent them from being highly susceptible to collapse. However (and in keeping with the rest of this Article), this Part will restrict its focus to equity market structure reform—many of the most salient financial stability concerns associated with HFT would be better addressed by market regulation, and the

304. Press Release, SEC, SEC Charges Knight Capital With Violations of Market Access Rule (Oct. 16, 2013), <https://www.sec.gov/news/press-release/2013-222>; Press Release, SEC, SEC Charges N.Y.-Based High Frequency Trading Firm With Violating Net Capital Rule For Broker-Dealers: \$16 Million Penalty Is Largest Ever for Net Capital Rule Violations (Sep. 17, 2014), <https://www.sec.gov/news/press-release/2014-199>; Press Release, SEC, Latour Trading Charged With Market Structure Rule Violations: High-Frequency Trading Firm to Pay More Than \$8 Million to Settle Charges (Sep. 30, 2015), <https://www.sec.gov/news/pressrelease/2015-221.html>.

305. Press Release, SEC, SEC Proposes Rule to Require Broker-Dealers Active in Off-Exchange Market to Become Members of National Securities Association: Amendments Would Enhance Regulatory Oversight of Active Proprietary Trading Firms (Mar. 25, 2015), <https://www.sec.gov/news/pressrelease/2015-48.html>.

306. Lin, *supra* note 181, at 692. For proponents of free markets, the practical takeaway from the position that equities markets are semi-strong efficient is that so long as a level informational playing field is created, the markets will generate the best possible outcomes without further regulatory interference. DAVID M. DRIESEN, *THE ECONOMIC DYNAMICS OF LAW* 83–84 (2012); see also DOMBALAGIAN, *CHASING THE TAPE*, *supra* note 76, at 23.

307. Allen, *A New Philosophy*, *supra* note 91, at 178.

308. White, SEC after the Financial Crisis, *supra* note 229.

SEC is likely to be more comfortable taking this type of action than implementing prudential regulation.

The most extreme market-based approach to addressing the problems associated with HFT would be to ban the practice altogether, so that other market participants come to rely on other sources of market liquidity.³⁰⁹ Even if desirable, however, crafting and enforcing such a ban would be difficult for the SEC.³¹⁰ Such a ban would have to include definitions that distinguished between the panoply of ever-evolving trading strategies to be prohibited and other algorithmic trading strategies that cause fewer concerns from a financial stability perspective, and which should therefore be preserved to promote market efficiency. Unless such definitions were drafted extremely carefully and updated frequently, the ban would be highly porous and susceptible to significant regulatory arbitrage. Given these difficulties, policymakers who wish to eliminate HFT have instead focused on implementing a “transaction tax”: such a tax would be very small on a per-transaction basis, but enough to erode the tiny per-transaction profits that—in the aggregate—make HFT a lucrative strategy.³¹¹ The imposition of such a tax would be a matter for Congress rather than the SEC, though, and while certain members of Congress have proposed implementing such a tax, these proposals have not gained much traction in the United States.³¹²

It is, however, open to the SEC to discourage HFT by implementing other structural measures designed to reduce the profitability of the HFT model. Such measures might include rules increasing the minimum pricing increment that can be used when trading equity securities (the so-called “tick size”);³¹³ rules limiting the ability of traders to cancel orders;³¹⁴ rules requiring that “private dissemination of quote and trade information be delayed until the exclusive processor under the Regulation NMS scheme, referred to as the ‘SIP,’ has publicly disseminated information from all exchanges”;³¹⁵ rules requiring exchanges to hardwire latency or “speed bumps” into trade execution;³¹⁶ and rules

309. If HFT were not responsible for providing the majority of liquidity to the equity markets, regulators would not have to worry about the sudden withdrawal of high frequency traders from the market causing such liquidity to evaporate.

310. It should be noted that these types of reforms could pose some costs for capital formation in the short-term, in that they would reduce execution speeds, as well as the amount of granular order information available to other market participants. Matt Levine, *High-Speed Traders Still Trading Faster than Low-Speed Traders*, BLOOMBERG VIEW (Mar. 18, 2014, 1:20 PM), <https://www.bloomberg.com/view/articles/2014-03-18/high-speed-traders-still-trading-faster-than-low-speed-traders>. In the longer term, however, any rule that helps ensure continuing liquidity will assist with the formation of capital. See *supra* Part V.D.

311. MARK P. KEIGHTLEY, CONG. RESEARCH SERV., R42078, FINANCIAL TRANSACTION TAXES: IN BRIEF, 4 (2015).

312. RENA S. MILLER & GARY SHORTER, CONG. RESEARCH SERV., R44443, HIGH FREQUENCY TRADING: OVERVIEW OF RECENT DEVELOPMENTS 13 (2016).

313. It has been argued that increased tick size “[w]ill curtail speculative and high-frequency trading by adding ‘friction’ (cost) to trading, thereby favoring fundamentally oriented, long-term investors. Will increase the incentive for stockbrokers to market shares to investors.” David Weild et al., *The trouble with small tick sizes: Larger tick sizes will bring back capital formation, jobs and investor confidence*, GRANT THORNTON 4 (Sept. 2012), <https://www.sec.gov/info/smallbus/acsec/acsec-backgroundmaterials-090712-weild-article.pdf>.

314. Pasquale, *supra* note 97, at 2110, 2119.

315. Fox et al., *supra* note 129, at 269.

316. The SEC has already permitted the creation of one such exchange. *SEC Approves IEX Proposal to Launch National Exchange, Issues Interpretation on Automated Securities Prices: Staff Issues Guidance on Speed Bumps*, SEC (June 17, 2016), <https://www.sec.gov/news/pressrelease/2016-123.html>. For a survey of other proposals to dampen the appeal of HFT strategies, see DOMBALAGIAN, CHASING THE TAPE, *supra* note 76, at

requiring orders to be processed in batch auctions rather than continuously.³¹⁷ Proposals have also been made for measures that focus directly on the continuing provision of liquidity, rather than on making HFT less profitable. For example, in addition to deploying emergency measures like circuit breakers when the markets are in turmoil,³¹⁸ the SEC could consider imposing legal duties on HFT firms to continue providing liquidity even during periods of extreme volatility, similar to the duties that were applied to market-makers in the past.³¹⁹ The SEC has also discussed implementing an anti-disruptive trading rule “tailored to apply to active proprietary traders in short time periods when liquidity is most vulnerable and the risk of price disruption caused by aggressive short-term trading strategies is highest.”³²⁰ The SEC will not be able to enforce any such rules against HFT firms if it doesn’t have authority over them, however: many HFT firms currently rely on an exemption in Exchange Act Rule 15b9-1 to avoid registration with FINRA—a self-regulatory authority to which the SEC has delegated much of its oversight of market participants.³²¹ As such, an amendment to Rule 15b9-1 requiring registration of proprietary HFT firms (similar to the one the SEC proposed in 2015)³²² would be a necessary precondition to continuing liquidity provision obligations or anti-disruptive trading regulation.

In order to regulate the operations of HFT firms, the SEC may also wish to acquire information about those firms’ trading algorithms.³²³ It is open to the SEC to follow the CFTC’s lead and propose a rule that would require HFT firms to allow regulators to access their source code,³²⁴ however, HFT firms jealously guard the confidentiality of their trading algorithms, and the CFTC’s proposal has met with significant backlash from

173–74; Sokol, *infra* note 334, at 455–64.

317. Eric B. Budish et al., *The High-Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response*, 130 Q. J. ECON. 1547 (2015).

318. See *supra* text accompanying notes 217–22.

319. Fox et al., *supra* note 129, at 272.

320. Mary Jo White, Chair, SEC, Optimizing Our Equity Market Structure: Opening Remarks at the Inaugural Meeting of the Equity Market Structure Advisory Committee (May 13, 2015), <https://www.sec.gov/news/statement/optimizing-our-equity-market-structure.html>.

321. Samuel Branum, *SEC to Increase Oversight of High Frequency Trading Firms Under a Proposed Amendment to Rule 15b9-1*, TIMELY TECH @ THE UNIV. OF ILL. (Jan. 19, 2017), <http://illinoisjltip.com/timelytech/sec-to-increase-oversight-of-high-frequency-trading-firms-under-a-proposed-amendment-to-rule-15b9-1/>.

322. Exemption for Certain Exchange Members, 80 Fed. Reg. 18,036 (Apr. 2, 2015) (codified at 17 C.F.R. pt. 240).

323. Even with comprehensive information about orders and trades, however, it may be difficult for the SEC to deduce the highly sophisticated (and confidential) trading strategies being deployed by market participants from their trading behavior. IOSCO HFT REPORT, *supra* note 122, at 30.

324. The original proposed rule required HFT firms to maintain “a source code repository to manage source code access, persistence, copies of all code used in the production environment, and changes to such code . . .” Regulation Automated Trading, 80 Fed. Reg. 78,824, 78,857 (2015). Following significant industry criticism, the CFTC issued a Supplemental Proposal in November 2016 that was intended to

set conditions for the CFTC to request algorithmic trading source code; to reduce the number of persons potentially subject to Reg AT’s registration requirement and associated duties; to limit potential overlap in market participants’ responsibilities for pre-trade risk controls; to establish a means by which so-called ‘AT Persons’ using third-party-developed algorithmic trading systems can meet their regulatory requirements; and to refine the proposed reporting obligations of AT Persons. *CFTC Approves Supplemental Proposal for Reg AT*, SIDLEY (Nov. 22, 2016), <https://www.sidley.com/en/insights/newsupdates/2016/11/cftc-approves-supplemental>.

industry members.³²⁵ Such industry concern is understandable, but it is also true that regulatory attempts to address the systemic risks posed by HFT will be stymied if regulators do not understand the trading that they are regulating. Measures like the FINRA rules requiring regulated HFT firms to review and test their own algorithms will be insufficient,³²⁶ as market participants lack the data and perspective necessary to conduct stress tests that might detect the systemic impact that their algorithms could have.³²⁷

However, given that the algorithms and trading strategies used by market participants are often obsolete within weeks or months of their creation,³²⁸ regulators are unlikely to be able to keep up with all the nuances of such strategies, even if they are successful in compelling HFT firms to disclose all of their code. Instead, to the extent the SEC is focused on avoiding the evaporation of liquidity from the equity markets, it might make sense to focus on the circumstances in which algorithms are programmed to withdraw from trading. Given that little code is devoted to rare occurrences, trading algorithms are likely to be much more simple, predictable, and less diversified in their responses to unusual events than they are in their creative responses to normal trading.³²⁹ If the SEC were to promulgate a rule that allows it to collect data about the circumstances in which HFT algorithms are programmed to stop trading, which might face less industry resistance than a rule seeking to compel disclosure of trading algorithms more generally, the SEC may have some success in predicting how liquidity in the equities markets may dry up in response to a shock.

Of course, even if the SEC is able to compel the disclosure of source code, that code will be useless to the SEC if the agency lacks the resources to process it. Indeed, financial stability regulation in general has become an increasingly data-driven exercise,³³⁰ and IOSCO has noted that “[h]aving sophisticated systems or algorithms that monitor trading and detect patterns is a necessity [for regulators] in this environment of high speed and complex trading in order to maintain market integrity and confidence”.³³¹ The SEC has certainly taken some steps to bolster its data collection and analysis capacities: in the wake of the Crisis, it formed a new Department of Economic and Risk Analysis (DERA) to “integrate financial economics and rigorous data analytics into the core mission of the SEC.”³³² In 2013, the SEC rolled-out the MIDAS system, which “collects and processes

325. Industry members have argued that “giving the government access to their sensitive intellectual property—the secret sauce of their algorithms—is too big a risk.” Warmbrodt, *supra* note 130.

326. *Regulatory Notice 15-09: Equity Trading Initiatives: Supervision and Control Practices for Algorithmic Trading Strategies*, FINRA 4 (Mar. 2015), https://www.finra.org/sites/default/files/notice_doc_file_ref/Notice_Regulatory_15-09.pdf.

327. Brummer, *supra* note 33, at 1043.

328. IOSCO HFT REPORT, *supra* note 122, at 11.

329. Yadav, *Algorithmic Trading*, *supra* note 120, at 1614. Aguilar, *Evolving Equity Markets*, *supra* note 221. In referring to market turbulence on August 24, 2015, Aguilar noted that “[t]hese algorithms may not be programmed to deal with rare events like re-opening auctions or extreme spikes in volatility, and this may be one reason that re-opening auctions . . . struggled to attract liquidity.”

330. “Real-time monitoring of trading activity is critical to timely deploying of circuit breakers, calibrating trading facilities and proprietary market-making systems, and taking other prophylactic measures in the face of trading errors, algorithmic snafus, or temporary imbalances in supply or demand. To anticipate market disruptions caused by systems failures and other threats to the operational stability and integrity of markets, regulators must also be able to identify weaknesses in communications of trading systems or contagion across markets.” Dombalagian, *Preserving Human Agency*, *supra* note 66, at 80.

331. IOSCO HFT REPORT, *supra* note 122, at 13.

332. *Economic and Risk Analysis: About the Division*, SEC, <https://www.sec.gov/dera> (last visited Mar. 28, 2018).

both public consolidated and proprietary feeds from equity markets, as well as information from related options and futures markets, to monitor and analyze market disruptions, reconstruct market events, and anticipate other trends in trading.”³³³ The SEC also plans to develop an ambitious Consolidated Audit Trail (CAT)³³⁴—although the project has stalled so far,³³⁵ by providing a record of “every order and trade made in the [equities] market, across venues and systems” if completed, the CAT would be very helpful to the SEC in tracking the trading behavior of high frequency traders and participants in otherwise opaque dark pools.³³⁶

Going forward, proponents of the field of “RegTech”—which seeks to use technology to improve monitoring, reporting and compliance³³⁷—see a great capacity for machine learning and other sophisticated analytical tools to identify systemic risks in real time, allowing for earlier intervention.³³⁸ Advances in this interdisciplinary field could assist the SEC in devising simulations that model the responses of HFT algorithms to shock events, and the responses of humans (and other algorithms) to the actions of the HFT algorithms.³³⁹ Insights from behavioral finance could be instructive in suggesting the types of cognitive biases and herd behaviors that might inform the responses of human market participants to market events.³⁴⁰ These insights could then be combined with insights from the field of complexity science to allow for modeling of the propagation of systemic risk: Joshua Epstein’s book *Agent_Zero: Toward Neurocognitive Foundations for Generative Social Science* demonstrates the sophistication of the agent-based modeling technology now available.³⁴¹ Models can now incorporate thousands of variables, including affective,

333. Dombalagian, *Preserving Human Agency*, *supra* note 66, at 77.

334. SEC, *Consolidated Audit Trail*, 77 Fed. Reg. 45,722 (2012). The SEC has also engaged in some internal reorganization to better enable its staff to use data once it is collected. Nathaniel E. Sokol, *High Frequency Litigation: SEC Responses to High Frequency Trading as a Case Study in Misplaced Regulatory Priorities*, 17 COLUM. SCI. & TECH. L. REV. 402, 452 (2016).

335. Commissioner Stein noted in September 2015 that “as I stand before you today, we have no consolidated audit trail. Construction of the CAT has not yet begun. Counting internal deliberations, nearly six years have been spent choosing someone to build the CAT.” Kara M. Stein, Comm’r, SEC, *Market Structure in the 21st Century: Bringing Light to the Dark: Remarks before the Securities Traders Association’s 82nd Annual Market Structure Conference* (Sept. 30, 2015), <https://www.sec.gov/news/speech/stein-market-structure.html> [hereinafter Stein, *Market Structure in the 21st Century*]. Concerns about cybersecurity have informed industry opposition to the CAT. Peter J. Henning, *S.E.C. Hacking Response Provides Road Map for Compromised Companies*, N.Y. TIMES: DEALBOOK (Sept. 26, 2017), <https://www.nytimes.com/2017/09/26/business/dealbook/sec-hack.html>.

336. Stein, *Market Structure in the 21st Century*, *supra* note 335.

337. Douglas W. Arner et al., *FinTech, RegTech and the Reconceptualization of Financial Regulation*, 37 NW. J. INT’L L. & BUS. 371, 373 (2017).

338. There are an increasing range of machine learning, computational statistics, complexity and statistical physics algorithms (such as Deep Learning) that offer the potential of powerful data mining and simulation techniques for enhanced decision taking. *See also* Arner et al., *supra* note 337.

339. Former SEC Commissioner Aguilar called for such “Live Simulations and Robust Testing of Business Continuity Plans for Trading Software.” Aguilar, *Addressing Market Instability*, *supra* note 284.

340. In the future, RegTech models may allow for “sentiment monitoring”. Walport, *supra* note 66. For a discussion of “why asset markets move too much, the psychology that affects them, and the feedbacks between them and the real economy.” *See* GEORGE A. AKERLOF & ROBERT J. SHILLER, *ANIMAL SPIRITS: HOW HUMAN PSYCHOLOGY DRIVES THE ECONOMY, AND WHY IT MATTERS FOR GLOBAL CAPITALISM*, 131–48 (2009).

341. JOSHUA M. EPSTEIN, *AGENT_ZERO: TOWARDS NEUROCOGNITIVE FOUNDATIONS FOR GENERATIVE SOCIAL SCIENCE* 81 (2013). “In agent modeling, we essentially build artificial societies of software individuals who can interact directly with one another and with their environment according to simple behavioral rules.” Agent-based models have also been described as “computer models in which the behavior of agents and their

cognitive and social dynamics between actors—with the affective, cognitive and social links between such actors being scored on the strength of the link, not just its existence.³⁴² With this level of sophistication, the contagion of a market panic can be modeled to some degree,³⁴³ and one can only assume that models will become more sophisticated in the future—ideally, so that they can also model how the implementation of regulation is likely to alter market participants' behavior.³⁴⁴

Certainly, our expectations for such simulations and models should be measured—they are not intended to exactly predict and prevent future crises.³⁴⁵ Furthermore, the available data set for these types of exercises only goes back a few decades, limiting their predictive capacity.³⁴⁶ But, these simulations can alert the SEC to some of the vulnerabilities in the equity markets so that it can work, in advance of a future crisis, to address those vulnerabilities through business conduct rules and organizational governance requirements, as well as to refine the emergency measures it may need to take if *ex ante* rules are not completely successful in shoring up the stability of the financial system.

Importantly, the SEC does not need to collect, process and model *all* of the data related to financial stability on its own. Particularly given its perennial budget constraints,³⁴⁷ the SEC should take advantage of the work being done by the Federal Reserve and the Office of Financial Research (OFR),³⁴⁸ including the Financial Stability Monitor developed by the OFR, which functions as “a heat map of key risk indicators” that assists in the monitoring of—amongst other things—market risk.³⁴⁹ However, before the SEC can extract maximum benefit from these tools and from interagency collaboration more generally, the data sharing policies of the various financial regulatory agencies need to be harmonized³⁵⁰—this is a step that the agencies should prioritize. Although some might be dubious about the prospects of such inter-agency collaboration, data formats are likely to become more standardized as financial regulation, both domestic and international, requires the reporting of more and more granular data—harmonization of data reporting could be driven as much by financial institutions (who wish to avoid having to report the same data to different regulators in multiple formats) as by regulators.³⁵¹

interactions are explicitly represented as decision rules mapping agents' observations onto actions.” Stefano Battiston et al., *Complexity theory and financial regulation*, 351 SCI. MAG. 818, 819 (2016).

342. Epstein, *supra* note 341, at 15.

343. “Agent 0 does not act based on either one of the others alone. Here, he requires the swarm, the weighted sum, and multiple dispositional exposures to go.” *Id.* at 96.

344. Walport, *supra* note 66.

345. Eamon Javers, *Pentagon Preps for Economic Warfare*, POLITICO (Apr. 9, 2009), <http://www.politico.com/news/stories/0409/21053.html>.

346. “Good, computer-ready historical price information only goes back to the 1970s or ‘80s.” Tommy Wilkes & Laurence Fletcher, *Special Report: The algorithmic arms race*, REUTERS (May 21, 2012), <https://www.reuters.com/article/us-trading-blackbox/special-report-the-algorithmic-arms-race-idUSBRE84K07320120521>.

347. For a discussion of the SEC's historical difficulties in obtaining from the Congressional appropriations process sufficient funding to discharge its missions, see Joel Seligman, *Self-Funding for the Securities and Exchange Commission*, 28 NOVA L. REV. 233 (2004).

348. At the time of writing, neither the Federal Reserve nor the OFR were subject to the Congressional appropriations process.

349. *Annual Report to Congress: 2016*, OFF. OF FIN. RES. 15 (2017), <https://www.financialresearch.gov/annual-reports/files/office-of-financial-research-annual-report-2016.pdf>.

350. See *supra* note 50 and accompanying text.

351. Arner et al., *supra* note 337, at 7; Walport, *supra* note 66, at 47–49.

VII. CONCLUSION

This Article has explored how the rise of HFT can impact financial stability. This Article has also set out the legislative basis for the SEC's authority to act as a financial stability regulator. The remaining question, then, is whether the SEC will choose to use its authority to mitigate the potential systemic impact of HFT. The SEC has, at times, lacked confidence in its own ability to regulate market structure, but the SEC's communications on HFT promulgated between January 2010 and January 2017 were promising. Those communications indicated that as the SEC considered how to address the increasing prominence of HFT, many commissioners and senior staff members were particularly concerned with maintaining the stability of the equity markets and the financial system as a whole. However, it is not clear whether the SEC will continue this approach during the Trump administration.

If the SEC, under Chairman Clayton's leadership, decides to focus on capital formation to the neglect of financial stability, then there will be a significant gap in the financial regulatory architecture in the United States. The FSOC will have insufficient information about what is transpiring in the equity markets, and may underestimate the potential for events occurring there to metastasize into broader financial instability that can have disastrous effects on the broader economy. To avoid such an outcome, the SEC should deploy its expertise to maintain the orderly functioning of the equity markets and alert the broader financial regulatory community to the ways in which HFT can generate and transmit systemic risks—in particular, the vulnerabilities associated with the liquidity that HFT provides. Importantly, such an approach does not require the SEC to act as a prudential regulator. Instead, the SEC can contribute to the stability of the financial system in a way that accords with its institutional identity—in its capacity as a market regulator.

Appendix A Testimony

Testimony Concerning the State of the Financial Crisis: Hearing Before the Fin. Crisis Inquiry Comm. (Jan. 14, 2010) (statement of Mary L. Schapiro, Chairman, SEC).

Testimony Concerning the Severe Market Disruption on May 6, 2010: Hearing Before the Subcomm. on Capital Mkts, Ins. and Gov't Sponsored Enters. of the U.S. H.R. Comm. on Fin. Serv. (May 11, 2010) (statement of Mary L. Schapiro, Chairman, SEC).

Examining the Causes and Lessons of the May 6th Market Plunge: Hearing Before the Subcomm. on Sec., Ins., & Inv. of the U.S. S. Comm. on Banking, Hous., & Urban Affairs (May 20, 2010) (statement of Mary L. Schapiro, Chairman, SEC).

Testimony Concerning Oversight on International Cooperation to Modernize Financial Regulation: Hearing Before the U.S. S. Banking Subcomm. on Sec. & Int'l Trade & Fin. (July 20, 2010) (statement of Kathleen L. Casey, Comm'r, SEC).

Testimony Concerning Oversight of the U.S. Securities and Exchange Commission: Evaluating Present Reforms and Future Challenges: Hearing Before the U.S. H.R. Comm. on Fin. Servs. Subcomm. on Capital Mkt., Ins., and Gov't Sponsored Enters. (July 20, 2010) (statement of Mary L. Schapiro, Chairman, SEC).

Testimony on U.S. Equity Market Structure by the U.S. Securities and Exchange Commission: Hearing Before the Subcomm. on Sec., Ins., and Inv. of the U.S. S. Comm. on Banking, Hous., and Urban Affairs & the U.S. S. Permanent Subcomm. on Investigations (Dec. 8, 2010) (statement of Mary L. Schapiro, Chairman, SEC).

Testimony of Monitoring Systemic Risk and Promoting Financial Stability: Hearing Before the U.S. S. Comm. on Banking, Hous. & Urban Affairs (May 12, 2011) (statement of Mary L. Schapiro, Chairman, SEC).

Testimony of Oversight of the SEC: Hearing Before the U.S. H.R. Comm. on Fin. Servs. (May 16, 2013) (statement of Mary Jo White, Chair, SEC).

Testimony on "Oversight of the SEC's Agenda, Operations and FY 2015 Budget Request": Hearing Before the U.S. H.R. Comm. on Fin. Servs. (Apr. 29, 2014) (statement of Mary Jo White, Chair, SEC).

Oversight of the SEC's Division of Trading and Markets: Hearing Before the Subcomm. on Capital Mkt. & Gov't Sponsored Enter. of the U.S. H.R. Comm. on Fin. Servs., 113th Cong. (2014) (statement of Stephen Luparello, Dir., SEC Div. of Trading & Mkts.).

Testimony of Regulatory Reforms to Improve Equity Market Structure: Hearing Before the Subcomm. on Sec., Ins., and Inv. of the U.S. S. Comm. on Banking, Hous., and Urban Affairs, (2016) (statement of Stephen Luparello, Dir., SEC Div. of Trading & Mkts.).

Oversight of the U.S. Securities and Exchange Commission: Hearing Before the U.S. S. Comm. on Banking, Hous., and Urban Affairs, 114th Cong. (2016) (statement of Mary Jo White, Chair, SEC).

Speeches

Mary L. Schapiro, Chairman, SEC, Statement at SEC Open Meeting — Market Access (Jan. 13, 2010), <https://www.sec.gov/news/speech/2010/spch011310mls.htm>

Mary L. Schapiro, Chairman, SEC, Statement on Market Structure Concept Release Before the Commission Open Meeting (Jan. 13, 2010), <https://www.sec.gov/news/speech/2010/spch011310mls-concept.htm>

Troy A. Paredes, Comm'r, SEC, Statement at Open Meeting Regarding Concept

Release on Equity Market Structure (Jan. 13, 2010), <https://www.sec.gov/news/speech/2010/spch011310tap-concept.htm>

Elisse B. Walter, Comm'r, SEC, Opening Remarks Regarding Concept Release on Equity Market Structure (Jan. 13, 2010), <https://www.sec.gov/news/speech/2010/spch011310ebw-concept.htm>.

Kathleen L. Casey, Comm'r, SEC, Statement at Open Meeting (Jan. 13, 2010), <https://www.sec.gov/news/speech/2010/spch011310klc-concept.htm>.

James A. Brigagliano, Deputy Dir., SEC Div. of Trading & Mkts., Keynote Speech of the SIFMA Dark Pool Symposium (Jan. 21, 2010), <https://www.sec.gov/news/speech/2010/spch012110jab.htm>. [Mary L. Schapiro,

Chairman, SEC, Looking Ahead and Moving Forward (Feb. 5, 2010). Elisse B. Walter, Comm'r, SEC, Opening Remarks Regarding Large Trader Reporting Requirement (Apr. 14, 2010), <https://www.sec.gov/news/speech/2010/spch041410ebw-trader.htm>. [Mary L. Schapiro, Chairman, SEC, Opening Statement at the SEC Open Meeting — Large Trader Reporting System (Apr. 14, 2010),

<https://www.sec.gov/news/speech/2010/spch041410mls-trader.htm>. James A. Brigagliano, Deputy Dir., SEC Div. of Trading & Mkts., Keynote Speech to the National Organization of Investment Professionals (Apr. 19, 2010), <https://www.sec.gov/news/speech/2010/spch041910jab.htm>. Mary L. Schapiro, Chairman, SEC, Keynote Address at the Compliance and Legal Society of the Securities Industry and Financial Markets Association 2010 Annual Seminar (May 6, 2010), <https://www.sec.gov/news/speech/2010/spch050610mls.htm>.

Mary L. Schapiro, Chairman, SEC, Opening Statement at SEC Market Structure Roundtable (June 2, 2010), <https://www.sec.gov/news/speech/2010/spch060210mls.htm>.

Mary L. Schapiro, Chairman, SEC, Remarks at CEO Quarterly Meeting of The Business Roundtable (June 8, 2010), <https://www.sec.gov/news/speech/2010/spch060810mls.htm>.

Mary L. Schapiro, Chairman, SEC, Remarks at the Stanford University Law School Directors College (June 20, 2010), <https://www.sec.gov/news/speech/2010/spch062010mls.htm>.

Mary L. Schapiro, Chairman, SEC, Remarks at the National Conference of the Society of Corporate Secretaries and Governance Professionals (July 9, 2010), <https://www.sec.gov/news/speech/2010/spch070910mls.htm>.

Gregg E. Berman, Senior Advisor to the Dir., SEC Div. of Trading & Mkts., Market Participants and the May 6 Flash Crash: Speech at the 11th Annual SIFMA Market Structure Conference, (Oct. 13, 2010), <https://www.sec.gov/news/speech/2010/spch101310geb.htm> [https://perma.cc/52R2-L38R].

Mary L. Schapiro, Chairman, SEC, Strengthening Our Equity Market Structure (Sept. 7, 2010), <https://www.sec.gov/news/speech/2010/spch090710mls.htm>.

Mary L. Schapiro, Chairman, SEC, Remarks Before the Security Traders Association (Sept. 22, 2010), <https://www.sec.gov/news/speech/2010/spch092210mls.htm>.

Troy A. Paredes, Comm'r, SEC, Remarks at the Security Traders Association 77th Annual Conference and Business Meeting (Sept. 24, 2010), <https://www.sec.gov/news/speech/2010/spch092410tap.htm>.

Carlo V. di Florio, Dir., Off. of Compliance Inspections and Examinations, Remarks at the 2010 NSCP National Meeting (Nov. 1, 2010),

<https://www.sec.gov/news/speech/2010/spch110110cvd.htm>.

Carlo V. di Florio, Dir., Off. of Compliance Inspections and Examinations, Remarks at the IA Watch Annual IA Compliance Best Practices Seminar (Mar. 21, 2011), <https://www.sec.gov/news/speech/2011/spch032111cvd.htm> [<https://perma.cc/WJ9C-BP8Y>].

Gregg E. Berman, Assoc. Dir., Off. Analytics and Research, SEC Div. of Trading and Mkts., Address at the 12th Annual SIFMA Market Structure Conference: Market Structure: What We Know, and What We Need to Know (Sept. 21, 2011), <https://www.sec.gov/news/speech/2011/spch092111geb.pdf>.

Mary L. Schapiro, Chairman, SEC, Evolving to Meet the Needs of Investors Address to Practising Law Institute's *SEC Speaks in 2011* Program (Feb. 4, 2011), <https://www.sec.gov/news/speech/2011/spch020411mls.htm..>

Mary L. Schapiro, Chairman, SEC, Remarks Before the Investment Company Institute's General Membership Meeting (May 6, 2011), <https://www.sec.gov/news/speech/2011/spch050611mls.htm>.

Troy A. Paredes, Comm'r, SEC, Remarks at the Symposium on "Hedge Fund Regulation and Current Developments" (June 8, 2011), <https://www.sec.gov/news/speech/2011/spch060811tap.htm>.

Mary L. Schapiro, Chairman, SEC, Opening Statement at SEC Open Meeting: Item 1—Large Trader Reporting (July 26, 2011), <https://www.sec.gov/news/speech/2011/spch072611mls-item1.htm>.

Mary L. Schapiro, Chairman, SEC, Introductory Remarks at SEC's Market Technology Roundtable (Oct. 2, 2012), <https://www.sec.gov/news/speech/2012-spch100212mlshtm>.

Daniel M. Gallagher, Comm'r, SEC, "Market 2012: Time for a Fresh Look at Equity Market Structure and Self-Regulation" (Oct. 4, 2012), <https://www.sec.gov/news/speech/2012-spch100412dmghtm>.

James R. Burns, Deputy Dir., Div. of Trading and Mkts, Introductory Remarks at the SEC's Roundtable on Decimalization (Feb. 5, 2013), <https://www.sec.gov/News/Speech/Detail/Speech/1365171492188>.

Elisse Walter, Chairman, SEC, Harnessing Tomorrow's Technology for Today's Investors and Markets (Feb. 19, 2013), <https://www.sec.gov/news/speech/2013-spch021913ebwhm>.

Luis A. Aguilar, Comm'r, SEC, Addressing Market Instability through Informed and Smart Regulation (Feb. 22, 2013), <https://www.sec.gov/news/speech/2013-spch022213laahm>.

Gregg E. Berman, Assoc. Dir., SEC Office of Analytics and Research Div. of Trading & Mkts., Transformational Technologies, Market Structure, and the SEC (June 18, 2013), <https://www.sec.gov/news/speech/2013-spch061813gebhtm>.

Mary Jo White, Chair, U.S. SEC, Address at the Council of Institutional Investors Fall Conference: Deploying the Full Enforcement Arsenal (Sept. 26, 2013), <https://www.sec.gov/news/speech/spch092613mjw>.

Mary Jo White, Chair, SEC, Focusing on Fundamentals: The Path to Address Equity Market Structure (Oct. 2, 2013), <https://www.sec.gov/news/speech/2013-spch100213mjw>.

Kara M. Stein, Comm'r, SEC, Remarks at the American Bar Association Business Law Section's Federal Regulation of Securities Committee Fall Meeting (Nov. 22, 2013), <https://www.sec.gov/news/speech/2013-spch112213kms>.

Luis A. Aguilar, Comm'r, SEC, "Seeing Capital Markets Through Investor Eyes" (Dec. 5, 2013), <https://www.sec.gov/news/speech/2013-spch120513-2laa>.

Michael S. Piwowar, Comm'r, SEC, The Benefit of Hindsight and the Promise of Foresight: A Proposal for a Comprehensive Review of Equity Market Structure (Dec. 9, 2013), <https://www.sec.gov/news/speech/2013-spch12013msp>.

Mary Jo White, Chair, SEC, Address at the 41st Annual Securities Regulation Institute: The SEC in 2014 (Jan. 27, 2014), <https://www.sec.gov/news/speech/2014-spch012714mjw>.

Kara M. Stein, Comm'r, SEC, Remarks before Trader Forum 2014 Equity Trading Summit (Feb. 6, 2014), <https://www.sec.gov/news/speech/2014-spch020614kms>.

Kara M. Stein, Comm'r, SEC, Remarks at the "SEC Speaks" Conference (Feb. 21, 2014), <https://www.sec.gov/news/speech/2014-spch020421kms>.

Gregg E. Berman, Assoc. Dir., SEC Office of Analytics and Research Div. of Trading & Mkts., What Drives the Complexity and Speed of Our Markets? (Apr. 15, 2014), <https://www.sec.gov/news/speech/2014-spch041514geb>.

Michael S. Piwowar, Comm'r, SEC, Remarks to the First Annual Conference on the Regulation of Financial Markets (May 16, 2014), <https://www.sec.gov/news/speech/2014-spch051614msp>.

Andrew Ceresney, Dir. of the Div. of Enf't, SEC, Keynote Address at Compliance Week 2014 (May 20, 2014), <https://www.sec.gov/news/speech/2014-spch052014ajc>.

Mary Jo White, Chair, SEC, Enhancing Our Equity Market Structure (June 5, 2014), <https://www.sec.gov/news/speech/2014-spch060514mjw>.

Mary Jo White, Chair, SEC, Intermediation in the Modern Securities Markets: Putting Technology and Competition to Work for Investors (June 20, 2014), <https://www.sec.gov/news/speech/2014-spch062014mjw>.

Michael S. Piwowar, SEC. Comm'r, Remarks at AEI Conference on Financial Stability (July 15, 2014), <https://www.sec.gov/news/speech/2014-spch071514msp>.

Daniel M. Gallagher, Comm'r, SEC, Remarks to the Georgetown University Center for Financial Markets and Policy Conference on Financial Markets Quality (Sept. 16, 2014), <https://www.sec.gov/news/speech/2014-spch091614dmg.html>.

Daniel M. Gallagher, Comm'r, SEC, The Importance of the SEC's Rulemaking Agenda-You Are What You Prioritize: Remarks at the 47th Annual Securities Regulation Seminar of the Los Angeles County Bar Association (Oct. 24, 2014), <https://www.sec.gov/news/speech/2014-spch102414dmg>.

Mary Jo White, Chair, SEC, Chairman's Address at SEC Speaks 2015 (Feb. 20, 2015), <https://www.sec.gov/news/speech/2015-spch022015mjw.html>.

Luis A. Aguilar, Comm'r, SEC, Preparing for the Regulatory Challenges of the 21st Century (Mar. 20, 2015), <https://www.sec.gov/news/speech/preparing-for-regulatory-challenges-of-21st-century.html>.

Kara M. Stein, Comm'r, SEC, The Dominance of Data and the Need for New Tools: Remarks at the SIFMA Operations Conference (Apr. 14, 2015), <https://www.sec.gov/news/speech/2015-spch041415kms.html>.

Mary Jo White, Chair, SEC, Keynote Address at the Evolving Structure of the U.S. Treasury Market Conference, Federal Reserve Bank of New York: "Taking Stock of Treasury Market Regulation" (Oct. 20, 2015), <https://www.sec.gov/news/speech/taking-stock-of-treasury-market-regulation.html>.

Andrew Ceresney, Dir. of the Div. of Enf't, SEC, Market Structure Enforcement:

Looking Back and Forward (Nov. 2, 2015), <https://www.sec.gov/news/speech/ceresney-speech-sifma-ny-regional-seminar.html>.

Mary Jo White, Chair, SEC, Chairman's Address at SEC Speaks—"Beyond Disclosure at the SEC in 2016" (Feb. 19, 2016), <https://www.sec.gov/news/speech/white-speech-beyond-disclosure-at-the-sec-in-2016-021916.html>.

Mary Jo White, Chair, SEC, Keynote Address at Security Traders Association: Equity Market Structure in 2016 and for the Future (Sept. 14, 2016), <https://www.sec.gov/news/speech/white-equity-market-structure-2016-09-14.html>.

Mary Jo White, Chair, SEC, Keynote Address at the Evolving Structure of the U.S. Treasury Market Second Annual Conference: Prioritizing Regulatory Enhancements for the U.S. Treasury Market (Oct. 24, 2016), <https://www.sec.gov/news/speech/white-keynote-us-treasury-market-conference-102416.html>.

Kara M. Stein, Comm'r, SEC, Keynote Address to Big Data in Finance Conference: A Vision for Data at the SEC (Oct. 28, 2016), <https://www.sec.gov/news/speech/speech-stein-10-28-2016.html>.

Mary Jo White, Chair, SEC, Speech at The Economic Club of New York: "The SEC after the Financial Crisis: Protecting Investors, Preserving Markets" (Jan. 17, 2017), <https://www.sec.gov/news/speech/the-sec-after-the-financial-crisis.html>.

Public Statements

Mary L. Schapiro, Chairman, SEC, Opening Statement at SEC Open Meeting: Consolidated Audit Trail (July 11, 2012), <https://www.sec.gov/news/public-statement/2012-07-12-open-meeting-statement-mls>.

Kara M. Stein, Comm'r, SEC, Regulation Systems Compliance & Integrity (SCI) (Nov. 19, 2014), <https://www.sec.gov/news/public-statement/spch111914kms>.

Luis A. Aguilar, Comm'r, SEC, Statement at Open Meeting on Regulation SCI (Nov. 19, 2014), <https://www.sec.gov/news/public-statement/2014-111914laa>.

Luis A. Aguilar, Comm'r, SEC, U.S. Equity Market Structure: Making Our Markets Work Better for Investors (May 11, 2015), <https://www.sec.gov/news/statement/us-equity-market-structure.html>.

Luis A. Aguilar, Comm'r, SEC, Remarks at the Inaugural Meeting of the Equity Market Structure Advisory Committee (May 13, 2015), <https://www.sec.gov/news/statement/remarks-inaugural-meeting-emsac.html>.

Daniel M. Gallagher, Comm'r, SEC, Statement at the Inaugural Meeting of the Market Structure Advisory Committee (May 13, 2015), <https://www.sec.gov/news/statement/gallagher-remarks-inaugural-sec-equity-market-structure-advisor.html>.

Mary Jo White, Chair, SEC, Optimizing Our Equity Market Structure: Opening Remarks at the Inaugural Meeting of the Equity Market Structure Advisory Committee (May 13, 2015), <https://www.sec.gov/news/statement/optimizing-our-equity-market-structure.html>.

Luis A. Aguilar, Comm'r, SEC, Ere Misery Made Me Wise—The Need to Revisit the Regulatory Framework of the U.S. Treasury Market (July 14, 2015), <https://www.sec.gov/news/statement/need-to-revisit-regulatory-framework-us-treasury-market.html>.

Luis M. Aguilar, Comm'r, SEC, Evolving Equity Markets Require Constant Attention (Oct. 27, 2015), <https://www.sec.gov/news/statement/aguilar-emsac-10-2015.html>.

Luis A. Aguilar, Comm'r, SEC, Shedding Light on Dark Pools (Nov. 18, 2015),

<https://www.sec.gov/news/statement/shedding-light-on-dark-pools.html>.

Kara M. Stein, Comm'r, SEC, Statement on the Notice of the Joint Industry Plan on the Consolidated Audit Trail ("CAT") (Apr. 27, 2016), <https://www.sec.gov/news/statement/stein-statement-open-meeting-cat-042716.html>.

Mary Jo White, Chair, SEC, Statement at an Open Meeting on a Notice of the Consolidated Audit Trail National Market System Plan (Apr. 27, 2016), <https://www.sec.gov/news/statement/chair-white-open-meeting-042716.html>.

Kara M. Stein, Comm'r, SEC, Statement on Amendments to Disclosure of Order Handling Information (July 13, 2016), <https://www.sec.gov/news/statement/stein-statement-open-meeting-071316-order-handling.html>.

Kara M. Stein, Comm'r, SEC, Statement on the Joint Industry Plan on the Consolidated Audit Trail ("CAT") (Nov. 15, 2016), <https://www.sec.gov/news/statement/stein-statement-open-meeting-111516.html>.

Press Releases

Press Release, SEC, SEC Issues Concept Release Seeking Comment on Structure of Equity Markets (Jan. 13, 2010), <https://www.sec.gov/news/press/2010/2010-8.htm>.

Press Release, SEC, SEC Proposes Large Trader Reporting System (Apr. 14, 2010), <https://www.sec.gov/news/press/2010/2010-55.htm>.

Press Release, SEC, SEC Proposes Consolidated Audit Trail System to Better Track Market Trades (May 26, 2010), <https://www.sec.gov/news/press/2010/2010-86.htm>.

Press Release, SEC, SEC Announces Agenda and Panelists for Market Structure Roundtable (May 28, 2010), <https://www.sec.gov/news/press/2010/2010-92.htm>.

Press Release, SEC, SEC Adopts New Rule Preventing Unfiltered Market Access (Nov. 3, 2010), <https://www.sec.gov/news/press/2010/2010-210.htm>.

Press Release, SEC, SEC and UK FSA Hold Meeting of SEC-FSA Strategic Dialogue (Nov. 15, 2010), <https://www.sec.gov/news/press/2010/2010-221.htm>.

Press Release, SEC, SEC and FSA Co-Host International Roundtable on Market Structures (Oct. 14, 2011), <https://www.sec.gov/news/press/2011/2011-209.htm>.

Press Release, SEC, Alternative Trading System Agrees to Settle Charges That It Failed to Disclose Trading by an Affiliate (Oct. 24, 2011), <https://www.sec.gov/news/press/2011/2011-220.htm>.

Press Release, SEC, Chairman Schapiro Statement on Knight Capital Group Trading Issue (Aug. 3, 2012), <https://www.sec.gov/news/press-release/2012-2012-151.htm>.

Press Release, SEC, SEC to Host Market Technology Roundtable (Aug. 8, 2012), <https://www.sec.gov/news/press-release/2012-2012-153.htm>. Press Release, SEC, SEC Launches Market Structure Data and Analysis Website (Oct. 9, 2013), <https://www.sec.gov/news/press-release/2013-217>.

Press Release, SEC, SEC Charges Knight Capital with Violations of Market Access Rule (Oct. 16, 2013), <https://www.sec.gov/news/press-release/2013-222>.

Press Release, SEC, SEC Charges N.Y.-Based High Frequency Trading Firm With Violating Net Capital Rule for Broker Dealers (Sept. 17, 2014), <https://www.sec.gov/news/press-release/2014-199>.

Press Release, SEC, SEC Charges New York-Based High Frequency Trading Firm with Fraudulent Trading to Manipulate Closing Prices (Oct. 16, 2014), <https://www.sec.gov/news/press-release/2014-229>.

Press Release, SEC, SEC's FY 2014 Enforcement Actions Span Securities Industry and Include First-Ever Cases (Oct. 16, 2014), <https://www.sec.gov/news/press->

release/2014-230.

Press Release, SEC, SEC Charges Direct Edge Exchanges with Failing to Properly Describe Order Types (Jan. 12, 2015), <https://www.sec.gov/news/pressrelease/2015-2.html>.

Press Release, SEC, SEC Charges UBS Subsidiary with Disclosure Violations and Other Regulatory Failures in Operating Dark Pool, (Jan. 15, 2015) <https://www.sec.gov/news/pressrelease/2015-7.html>.

Press Release, SEC, SEC Proposes Rule to Require Broker-Dealers Active in Off-Exchange Market to Become Members of National Securities Association: Amendments Would Enhance Regulatory Oversight of Active Proprietary Trading Firms (Mar. 25, 2015), <https://www.sec.gov/news/pressrelease/2015-48.html>.

Press Release, SEC, SEC Charges ITG with Operating Secret Trading Desk and Misusing Dark Pool Subscriber Trading Information (Aug. 12, 2015), <https://www.sec.gov/news/pressrelease/2015-164.html>.

Press Release, SEC, Latour Trading Charged with Market Structure Rule Violations (Sept. 30, 2015), <https://www.sec.gov/news/pressrelease/2015-221.html>.

Press Release, SEC, SEC Announces Enforcement Results for FY 2015 (Oct. 22, 2015), <https://www.sec.gov/news/pressrelease/2015-245.html>.

Press Release, SEC, Barclays, Credit Suisse Charged with Dark Pool Violations (Jan. 31, 2016), <https://www.sec.gov/news/pressrelease/2016-16.html>.

Press Release, SEC, SEC Approves IEX Proposal to Launch National Exchange, Issues Interpretation on Automated Securities Prices (June 17, 2016), <https://www.sec.gov/news/pressrelease/2016-123.html>.