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Regulating to Achieve Stability in the Domain of High-Frequency Trading

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NOTE

**REGULATING TO ACHIEVE
STABILITY IN THE DOMAIN OF HIGH-
FREQUENCY TRADING**

*Lindsey C. Crump*¹

Cite as: Lindsey C. Crump, *Regulating to Achieve
Stability in the Domain of High-Frequency Trading*,
22 MICH. TELECOMM. & TECH. L. REV. 161 (2015).

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ABSTRACT

High-frequency trading has become a darling of capital markets debate. This debate thrives because the true and long-lasting effects of high-frequency trading are still unknown. On one hand, high-frequency trading evidences recent and powerful advances in trading technology; on the other, it is said to harness speed at the expense of fairness, prudence, and stability. In part because of this duality, the regulation of high-frequency trading in the United States has been slow to develop. Other nations, however, have been quicker to react and to promulgate laws that directly, or indirectly, affect high-frequency trading. This Note explores the legal responses to high-frequency trading across a multitude of nations. Drawing on insights from this global landscape, it proposes domestic structural reforms—such as a variable tick size regime, discrete call markets, and experimental order taxes—that would allow the positive potential of high-frequency trading to be realized, while minimizing its impact upon market stability.

INTRODUCTION	162
I. HIGH-FREQUENCY TRADING.....	163
A. <i>The Definition</i>	163
B. <i>The Technology</i>	164
C. <i>The Strategies</i>	166
1. Market Making Strategies	166
2. Opportunistic Strategies	167
3. Market Manipulation and Other “Predatory” Strategies	168

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II. HFT REGULATION AROUND THE WORLD	169
A. <i>United States</i>	169
1. Legislation and Regulation	170
2. Enforcement Actions.....	171
i. Market Access Rule Violations	171
ii. Market Manipulation.....	173
B. <i>Implementing MiFID II in the European Union</i>	174
1. United Kingdom.....	175
2. Germany.....	177
C. <i>Japan</i>	178
D. <i>China and Hong Kong</i>	178
III. DOMESTIC AND TRANSNATIONAL REGULATORY HFT REFORM	179
A. <i>Implementing Domestic Reforms</i>	180
1. Curtailing the “Race to Zero”: Realigning Incentives to Balance Price and Speed	180
i. Implementing Variable Tick Sizes	180
ii. Moving from a Continuous Market to a Call Market.....	181
2. Transaction Taxes	183
3. Increasing Obligations for Proprietary Traders	184
4. Increasing Technological Investment to Enhance Monitoring and Market Transparency	185
B. <i>Setting International Standards for HFT</i>	186
CONCLUSION	188

INTRODUCTION

“As soon as you realize that you are not able to execute your orders because someone else is able to identify what you are trying to do and race ahead of you to the other exchanges, it’s over,” he said. “It changes your mind.” He stewed on the situation; the longer he stewed, the angrier he became.

“It really just pissed me off,” he said. “That people set out in this way to make money from everyone else’s retirement account. I knew who was being screwed, people like my mom and pop, and I became hell-bent on figuring out who was doing the screwing.”²

The quote above is from Michael Lewis’s novel *Flash Boys*, depicting an interview with John Schwall, the Chief Operating Officer of Investors Exchange.³ John is a former day trader who grew disillusioned with Wall

2. MICHAEL LEWIS, *FLASH BOYS* 95 (2014).

3. IEX was formed by trader Brad Katsuyama as a response to concerns about the negative impact of HFT on the market. See Scott Patterson & Jenny Strasburg, *IEX to Apply for Exchange Status*, WALL ST. J. (Sept. 2, 2014), <http://www.wsj.com/articles/iex-to-apply-for-exchange-status-1409709842>.

Street and the perceived effects of high-frequency trading (“HFT”) on capital markets.⁴

Everyone has an opinion on HFT. Critics insist it is predatory and systematically fraudulent.⁵ Proponents caution that its benefits far outweigh any negative impact it may have on the market.⁶ The dissemination of insider accounts like *Flash Boys*—which confidently proclaims HFT to be the destruction of the stock market—has fueled public fervor for reform or elimination of HFT.

In short order, American federal and state agencies have responded with HFT-targeted lawsuits and proclamations. Furthermore, HFT now traverses the modern world, with reactionary regulations cropping up across Europe and Asia. Even amid agency reassurances that HFT should not be summarily dismissed as dangerous,⁷ enforcement against high-frequency traders (“HF-Traders”) has increased, seemingly because regulators recognize some intrinsic harm caused by HFT.

This Note presents and analyzes recent legal responses to HFT, and proposes that more proactive regulation should be implemented. Part I introduces HFT and related trading strategies. Part II examines current HFT regulatory structures both domestically and abroad, as well as recent HFT-related litigation in the United States. Part III puts forth potential structural reforms at a national level—such as variable tick sizes, discrete call markets, and experimental order taxation—as well as a more uniform global approach to regulation.

I. HIGH-FREQUENCY TRADING

A. *The Definition*

There is no uniform definition for HFT,⁸ likely because there is no singular, definitive HFT strategy. In the U.S., HFT is considered a subset of

4. See Jim Edwards, *How Knowledge of Credit Suisse's Dark Pool For High-Frequency Trading Leaked Out On LinkedIn*, BUS. INSIDER (Apr. 23, 2014).

5. See, e.g., Eric Schneiderman, N.Y. Attorney Gen., Robert Abrams Public Service Lecture at New York Law School: High-Frequency Trading & Insider Trading 2.0 (Mar. 18, 2014) (transcript available at http://www.ag.ny.gov/pdfs/HFT_and_market_structure.pdf) (asserting that high-frequency traders use technologic advantages to obtain information at a speed that is harmful to competitors).

6. See Alice K. Ross et al., *Robot Wars: How High Frequency Trading Changed Global Markets*, BUREAU OF INVESTIGATIVE JOURNALISM (Sept. 16, 2012), <http://www.theburauinvestigates.com/2012/09/16/robot-wars-how-high-frequency-trading-changed-global-markets> (citing support for HFT in reduced trading costs and increased market activity).

7. See, e.g., Mary Jo White, Chair, SEC, Speech at Sandler O'Neill Global Exchange and Brokerage Conference: Enhancing Our Equity Market Structure (June 5, 2014); Martin Wheatley, Chief Exec. Officer, Fin. Conduct Auth., Address at the Global Exchange and Brokerage Conference: Regulating High Frequency Trading (Apr. 6, 2014).

8. See SEC Concept Release on Equity Market Structure, 75 Fed. Reg. 3594, 3606–09, (Jan. 21, 2010) (to be codified at 17 C.F.R. pt. 242).

strategies within algorithmic trading—or “[c]omputerized trading controlled by algorithms.”⁹ Algorithmic trading is a more general practice within computer-based trading where a programmer designs software that implements a rule-based trading decision to be triggered when specific conditions are met within the market. Human involvement in algorithmic trading is mostly limited to the creation and implementation of the algorithms.¹⁰ Within algorithmic trading, HFT strategies are those that send orders into the market at high speeds and utilize short holding periods relative to other trading strategies.¹¹ HFT gained traction as technological advances increased the speed and efficiency with which trades could be executed. The Securities and Exchange Commission (“SEC”) characterizes HFTraders as “professional traders acting in a proprietary capacity that engage in strategies that generate a large number of trades on a daily basis.”¹² These HFTraders are proprietary because they trade with their own capital—not a client’s—and might be independent firms, or broker-dealer desks within larger firms or hedge funds.¹³

B. *The Technology*

One way to conceptualize HFT is the application of new technologies to existing trading strategies.¹⁴ Successful HFTraders must have technology that enables them to (1) process information as quickly, or quicker, than their competitors, and (2) reliably differentiate between valuable and valueless securities and respond appropriately.¹⁵

A primary HFT strategy is achieving and employing low latency—or reduced time delay for receiving, analyzing, and transmitting information and orders. Commentators refer to this as the “race to zero” because every innovative strategy or technological development that lowers latency inevitably becomes the industry’s new benchmark.¹⁶ Latency in HFT can be reduced by both technological and physical means. Technological

9. Johannes Pries et al., *Algorithmic Trading Patterns in Xetra Orders*, 13 EUR. J. FIN 717, 717 (2007).

10. Charles M. Jones, *What Do We Know About High-Frequency Trading?* 18 (Columbia Bus. Sch., Research Paper No. 13-11, 2013), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2236201.

11. See JONATHAN A. BROGAARD, *HIGH FREQUENCY TRADING AND ITS IMPACT ON MARKET QUALITY*, 67 (2010), available at http://fisher.osu.edu/supplements/10/10463/Jonathan_Brogaard_Paper.pdf.

12. SEC Release, *supra* note 8, at 3606.

13. *Id.*; Capgemini, *High Frequency Trading: Evolution and the Future* 6 (2012), https://www.capgemini.com/resource-file-access/resource/pdf/High_Frequency_Trading__Evolution_and_the_Future.pdf.

14. See SEC Release, *supra* note 8, at 3607.

15. See CAPGEMINI, *supra* note 13.

16. See Scott Patterson, *High-Speed Stock Traders Turn to Laser Beams*, Wall St. J. (Feb. 11, 2014). See also Andrew G. Haldane, Exec. Dir., Fin. Stability at the Bank of Eng., Speech at the International Economic Association Sixteenth World Congress: Race to Zero (July 8, 2011).

innovations—such as fiber optics,¹⁷ field programmable gate arrays,¹⁸ and increased bandwidth¹⁹—allow HFTraders to send and receive data more quickly than previously possible. Physically locating servers in close proximity to exchanges (a practice known as “colocation”) decreases the distance that data must travel, allowing HFTraders to wring out an edge of mere milliseconds over competitors.²⁰

While speed is important, it is only half of the equation. HFTraders must also constantly reprogram their algorithms to better “differentiate”—or analyze market information and craft order responses to real-world events. Competitive differentiation prevents competitors from using reverse engineering to decipher one’s algorithms and uncover one’s trading strategies.²¹ However, constant reprogramming opens the door to more frequent mistakes in algorithm execution. Since there is less time for testing and sniffing out programming bugs, it is more likely that a rogue algorithm or a “fat finger” incident will occur.²² Such errors can snowball into selloffs that can devastate a company or even an entire market.²³

17. See CAPGEMINI, *supra* note 13, at 12. The private construction of fiber optic cables physically connecting distant markets is one example of such infrastructure, e.g. Chicago to New York or New York to London. These million dollar projects have been constructed solely to shorten the journey—essentially traveling from point A to point B as the crow flies instead of winding along highways and other pre-existing routes. Yet even these investments have been rendered essentially obsolete with the subsequent introduction of micro- and millimeter wave technology. See, e.g., Christopher Steiner, *Wall Street’s Speed War*, FORBES (Sept. 9, 2010); Matthew Phillips, *Cable Across Atlantic Aims to Save Traders Milliseconds*, BLOOMBERG (Mar. 29, 2012), <http://www.bloomberg.com/news/articles/2012-03-29/cable-across-atlantic-aims-to-save-traders-milliseconds>; Patterson, *supra* note 16; Elaine Wah, *Michael Lewis Says the Market’s Rigged. But His ‘Flash Boys’ Rigged Themselves*, THE GUARDIAN (Apr. 4, 2014), <http://www.theguardian.com/commentisfree/2014/apr/04/michael-lewis-market-rigged-flash-boys-high-speed-trading>.

18. Field programmable gate arrays are a recently adopted technology involving integrated circuits designed to handle high performance computing, specifically related to algorithmic functions of speed and repetition that lend lower latency to HFT firms. See CAPGEMINI, *supra* note 13, at 12.

19. Like your internet at home, traders with more bandwidth can send larger amounts of data at high speeds—thus increasing their “data transfer rate”—between networks. See CAPGEMINI, *supra* note 13, at 12.

20. See Tom Groenfedt, *HFN Offers The Fastest Data Feeds — From Mahwah*, FORBES (Nov. 4, 2013).

21. See CAPGEMINI, *supra* note 13, at 12.

22. A “fat finger” error is a human error made by pressing the wrong key, or the right key too many or too few times, causing an unintended trade. See *Fat Finger Error*, INVESTOPEDIA, <http://www.investopedia.com/terms/f/fat-finger-error.asp> (last visited April 13, 2015). To curb accidental algorithmic mayhem, regulators have introduced circuit breakers that temporarily cut off a trader or a stock if abnormal trading patterns are detected. See SEC, INVESTOR BULLETIN: NEW MEASURES TO ADDRESS MARKET VOLATILITY (2013), available at <http://www.sec.gov/investor/alerts/circuitbreakersbulletin.htm>.

23. See Alexandria Stevenson, *Knight Capital to Pay \$12 Million Fine on Trading Violations*, N.Y. TIMES: THE DEALBOOK (Oct. 16, 2013, 3:41 PM), <http://dealbook.nytimes.com/2013/10/16/knight-capital-to-pay-12-million-fine-on-trading-violations> (describing the near

C. The Strategies

HFTraders profit on short-term trades—rather than long-term investments—through the tried-and-true strategy of buying low and selling high. With the relatively recent advent of computer-driven algorithmic trading, the spread between a trader’s high and low prices has shrunk to pennies.²⁴ The most profitable strategies in today’s markets aim to collect as many of those pennies as possible.

1. Market Making Strategies

As a traditional trading strategy, market making involves profiting on the bid-ask spread. “Market makers” transact on both sides of a trade—posting an offer to sell (ideally higher than market price) and a bid to buy (ideally lower than market price). Market makers are valued because they bring liquidity to the markets and minimize the bid-ask spread—two elements that are considered indicative of a healthy capital market. Liquidity in a market exists when traders are able to make trades easily, quickly, and without affecting the market. The larger the order a market can fill at a particular price, the more liquid (and efficient) the market. Smaller bid-ask spreads evidence overall market health by implying that the stock is trading competitively.²⁵ Such competition can be inferred from traders’ willingness to trade on a stock despite its relatively small profit margins.²⁶

Many trading platforms structure themselves to attract market-making HFTraders. HFTraders are desirable customers, because the platforms profit from trade volume and HFTraders trade quickly and often.²⁷ One strategy for attracting HFTraders is the pricing model of “maker-taker” rebates. In this model, the trader who posts the trade (the “maker”) collects a small rebate when the trade is executed. The trader who accepts the posted trade (the “taker”) pays a small fee to execute. The exchange platform profits on the difference between fee and rebate.

Rebate collection became a particularly profitable strategy for market makers in large part due to the SEC’s 2005 promulgation of Regulation National Market System (“Reg NMS”) and its “trade-through rule.”²⁸ The trade-through rule requires that every order be executed at the best price

bankruptcy of Knight Capital after a technological glitch resulted in market-wide disruption and a \$460 million loss to the firm).

24. See note about decimalization *infra* Part III.A.i.

25. See *e.g.*, Jeff Castura et al., Market Efficiency and Microstructure Evolution in U.S. Equity Markets: A High-Frequency Perspective 3 (Aug. 30, 2010), http://finance.wharton.upenn.edu/departments/Seminar/micro/Litzenberger_transient_vol5_2010.pdf.

26. See, *e.g.*, *id.*

27. See SCOTT PATTERSON, DARK POOLS 4-8 (2012).

28. See Regulation NMS, 70 Fed. Reg. 37,496, 37,496–98 (to be codified at 17 C.F.R. pts. 200, 201, 230, 240, 242, 249, & 270) (June 29, 2005) [hereinafter Reg. NMS].

available on any trading center.²⁹ When a platform cannot execute the order at the best price, it must either route it to another trading center displaying the best price or cancel and return the order.³⁰ The trade-through rule essentially “imposes a mandatory . . . low price guarantee—trading venues are required to match or beat their competitors’ prices.”³¹ Knowing orders will be matched on their platform only if they have the superior price, exchanges seek to increase liquidity and capture the lowest prices by inducing traders—with rebates—to submit resting “maker” orders to their exchange.

2. Opportunistic Strategies

Some less revered trading strategies are described as opportunistic: when a trader profits not from market making, but from exploiting market inefficiencies. HFTraders employ a strategy known as arbitrage through algorithms designed to “capture pricing inefficiencies between related products or markets.”³² Despite being labeled “opportunistic,” arbitrage is functionally one of the most effective means of creating an efficient and healthy market.

Pairs trading is one example of arbitrage strategy. HFTraders using this strategy identify complementary stocks using data mining and statistics,³³ and then use algorithms to predict changes in one stock’s performance on the basis of the other stock’s performance.³⁴ Pairs trading is beneficial because it improves price efficiency by transferring liquidity from an active stock to a stagnant stock.

Low latency also makes possible another practice known as latency arbitrage. When a firm receives information faster than another firm, it can trade against competitors who are now relying upon “stale” information. A firm achieving lower latency is able to recognize price discrepancies sooner and adjust its trading strategy to claim that profit.

Using different arbitrage strategies, HFTraders can even out price discrepancies across the market. The faster this process occurs, the faster stock

29. See SEC Release, *supra* note 8, at 3601. As per the SEC, Rule 611 provides a baseline assurance that: (1) Marketable orders will receive at least the best displayed price, regardless of the particular trading center that executes the order or where the best price is displayed in the national market system; and (2) quotations that are displayed at one trading center will not be bypassed by trades with inferior prices at any trading center in the national market system. Trading centers include “all exchanges, all ATSS (including ECNs and dark pools), all [Over the Counter] market makers, and any other broker-dealer that executes orders internally . . .” *Id.*

30. *Id.*

31. Charles R. Korsmo, *High-Frequency Trading: A Regulatory Strategy*, 48 U. RICH. L. REV. 523, 536-37 (2014).

32. SEC Release, *supra* note 8, at 3608.

33. EDGAR PEREZ, *THE SPEED TRADERS* 19 (2011).

34. *Id.*

prices reflect the real value of the underlying assets.³⁵ The logical inference is that not all opportunistic strategies are necessarily harmful strategies. Regulators and academics have spent considerable time analyzing how to help these HFTraders remain profitable—so that they might continue innovating and improving market efficiency—while delineating the truly unfair and anticompetitive practices outlined below.

3. Market Manipulation and Other “Predatory” Strategies

Market manipulation is deliberate, and illegal, interference with the fairness of the market to create artificial, false, or misleading appearances with respect to the price of a security. Though not necessarily illegal, a trading strategy is predatory when trader X influences market conditions to X’s benefit and trader Y’s detriment.

Within the realm of predatory trading exist order anticipation strategies. To prevent undesirable price movement, institutional investors seek to disguise large trades by breaking them up into smaller sets of trades. Order anticipation strategies attempt to identify and trade ahead of those large, disguised trades—known to HFTraders as “whales”—and then take advantage of any resulting price movement. When this is accomplished by guessing, it is the whale hunter’s good luck, sometimes called “wave-riding.” Wave-riding is seen as a competitive, but not illegal (or even necessarily unfair), trading strategy.³⁶ In contrast, when anticipatory trading strategies rely on reverse engineering of other traders’ algorithms and the misappropriation of their trade information, it is considered HFT-style insider trading or “front-running” and is patently illegal.³⁷ Though order anticipation predates HFT, HFTraders bring new sophistication to an old trick. HFTraders can “ping” trading venues with small, rapid orders, and employ “sophisticated pattern recognition software” to locate and trade ahead of hidden orders.³⁸

Momentum ignition is another predatory, but definitively illegal strategy through which traders attempt to influence market prices through schemes

35. “Real value” is a matter of some debate. Arbitrage unquestionably achieves informationally efficient prices, which is the result of accurately setting prices to reflect all publicly available information. It is less clear that it achieves fundamentally efficient prices, or prices that accurately reflect the true value of the stock’s underlying asset(s). Compare Eugene F. Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. OF FIN. 383, 383 (1970) (contending that “efficient” markets reflect all available information), with Burton G. Malkiel, *The Efficient Market Hypothesis and Its Critics*, 17 J. OF ECON. PERSPECTIVES 59, 75 (2003) (noting that arbitrageurs have difficulty in determining a stock’s fundamental values as well as in aligning its price with that value).

36. Adam Adler, *High Frequency Regulation: A New Model for Market Monitoring*, 39 VT. L. REV. 161, 175-76 (2014).

37. See SEC Release, *supra* note 8, at 3609; see also 17 C.F.R. § 240.10b-5 (2014).

38. Korsmo, *supra* note 31, at 548.

such as spoofing³⁹ or quote stuffing.⁴⁰ When spoofing, an HFTrader feigns interest in trading at a certain price by placing large orders, creating the illusion of demand in order to artificially move prices. The trader then cancels the original trades before they are executed and takes advantage of the resulting market distortion by buying or selling at the new, more desirable price. Quote stuffing involves placing orders and immediately canceling them in large enough quantities to clog the market's information pipes, ostensibly to create arbitrage opportunities or a relative speed advantage through one's own, unaffected processing power. Like order anticipation, momentum ignition closely resembles classic forms of market manipulation with the addition of new levels of HFT sophistication. The lack of discernable lines between manipulative and legitimate—even if seemingly predatory—patterns of trading in the HFT context can make it difficult to identify illegal behavior or transactions.⁴¹

II. HFT REGULATION AROUND THE WORLD

The tangible ramifications of HFT are still being studied, and regulators continue to contemplate lawmaking that will both harness the benefits and reduce the risks of HFT. Regulatory responses to HFT indicate that regulators are most concerned with the fairness and stability of national and global financial markets. Currently there is no uniform global approach to HFT regulation. The next section will take a closer look at the varying attitudes toward regulation and enforcement of HFT activity in several key geographic areas, including the United States, the European Union, and Asia.⁴²

A. United States

In the wake of ample concern about the effects of HFT on the market, the SEC has voiced its intent to increase and improve market monitoring,⁴³ and it has brought several high-profile lawsuits against HFT “offenders.”⁴⁴

39. See Andrew Harris & Matthew Leising, *High-Speed Trader Accused of Commodity Market ‘Spoofing’*, BLOOMBERG (Oct. 2, 2014), <http://www.bloomberg.com/news/articles/2014-10-02/high-speed-trader-accused-of-commodity-market-spoofing->.

40. See *Quote Stuffing Definition*, NASDAQ, <http://www.nasdaq.com/investing/glossary/q/quote-stuffing> (last visited Nov. 17, 2015).

41. See Korsmo, *supra* note 31, at 548-49.

42. This paper approaches HFT reform from a regulatory perspective, but does not assume that exchange-level reform would be undesirable or ineffective. If meaningful reform occurred at the exchange-level, a larger regulatory approach would likely look quite different than the approaches advocated herein.

43. Scott Patterson, *SEC Chairman Targets Dark Pools, High-Speed Trading*, WALL ST. J. (JUNE 6, 2014).

44. See discussion *infra* Part II.A.2. Schneiderman, *supra* note 5; see also John McCrank, *Exclusive: SEC Targets Ten Firms in High Frequency Trading Probe - SEC Document*, REUTERS (July 17, 2014), <http://www.reuters.com/article/2014/07/17/us-sec-investigation-high-frequencytrading-idUSKBN0FM2TW20140717>.

In addition to the SEC, agencies such as the Financial Industry Regulatory Authority (“FINRA”), and the Commodity Futures Trading Commission (“CFTC”) have levied fines and criminal charges against HFTraders. Not all regulatory messages regarding HFT, however, proclaim its dangers. For example, SEC Chair Mary Jo White stated that “[e]mpirical evidence shows that investors are doing better in today’s algorithmic marketplace than they did in the old manual markets.”⁴⁵

The next section reviews current and forthcoming legislation related to HFT to further analyze regulatory beliefs and intentions. This Note then tracks recent HFT litigation—in the context of Market Access Rule violations and manipulative trading activity—to explore law enforcement’s functional reaction to specific HFT strategies.

1. Legislation and Regulation

Trading in the U.S. financial market is governed at the federal level predominantly by the Securities Act of 1933 (“Securities Act”), the Securities Exchange Act of 1934 (“Exchange Act”), and the Commodity Exchange Act (“CEA”), as well as by the ‘blue sky laws’ of various states.⁴⁶ Generally, traditional securities laws govern HFT by restricting or forbidding certain trading behaviors. Since these laws were enacted long before the existence of HFT, they do not contain HFT-specific restrictions. In fact, the first piece of federal legislation to acknowledge HFT was the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (“Dodd-Frank Act”). Specific provisions addressing HFT lie in Sections 747 and 967 of the Dodd-Frank Act.

Section 747 of the Dodd-Frank Act is modeled after Section 10(b) of the Exchange Act. It amends Section 4c(a)(5) of the CEA (also known as the “prohibited transactions” provision) to cover disruptive trading in futures and derivatives markets.⁴⁷ Soon after the passage of the Dodd-Frank Act, the CFTC issued guidance on the new Section 4c(a)(5) of the CEA which specified the “intent” requirements for each prohibited transaction. According to this guidance, the CFTC can, for the first time, bring an enforcement action for market manipulation based on reckless conduct.⁴⁸

45. White, *supra* note 7.

46. INTERNATIONAL SECURITIES LAW HANDBOOK 504-05 (Jean-Luc Soulier & Marcus Best eds., 2d ed. 2005).

47. Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, § 747, 124 Stat. 1376, 1739 (2010) (codified as amended at 7 U.S.C. § 6c(a)(5)(C) (2010)).

48. Antidisruptive Practices Authority, 78 Fed. Reg. 31890 (May 28, 2013); *see also* Thomas K. Cauley et al., *Rules Against “Spoofing” and Other Disruptive Trading in Futures, Swaps and Options*, HEDGE FUND L. REPORT (Nov. 6, 2014) at 1, 1-2 (outlining the CFTC’s determination of the intent requirements under the CEA as follows: it is a per se violation of Section 4c(a)(5)(A) to violate bids or offers; a trader must show reckless disregard for orderly executions of transactions during the closing period to violate Section 4c(a)(5)(B); and a trader

Section 967 instructs the SEC to conduct a study on HFT in order to determine how the SEC can best monitor the effects of HFT in the market.⁴⁹ Although the SEC continues to mull over other elements of its regulatory task, it has recently approved a FINRA rule revision that requires previously unregistered HFTraders—“proprietary” traders, or HFTraders who trade with their own capital, and the principals who supervise them—to register with and submit to FINRA oversight.⁵⁰

Members of the House and Senate have also introduced a number of automated trading and HFT-specific proposals during the 113th Congress.⁵¹ Although none of the bills have yet to survive Congress, they demonstrate that concerns about HFT and its effects have infiltrated committee and subcommittee hearings in recent years. In spite of the dearth in HFT-specific legislation, U.S. agencies like the SEC, CFTC, and Department of Justice have announced legal actions against HFTraders under existing securities laws.

2. Enforcement Actions

Federal agencies with the authority to bring enforcement actions have focused much of their prosecutorial resources on Market Access Rule violations and market manipulation. These two violations will be discussed below in the context of recent cases and settlements.

i. Market Access Rule Violations

The Market Access Rule⁵² requires registered firms—*i.e.* brokers and dealers providing market access to other traders—to develop and maintain a system to manage risks and supervise unregistered traders on their platform.⁵³ Currently, sophisticated customers seek direct or sponsored market

must show intent some degree beyond recklessness to violate Section 4c(a)(5)(C)’s prohibition on spoofing).

49. Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, § 967, 124 Stat. 1376, 1913 (2010).

50. Order Approving a Proposed Rule Change to Establish the Securities Trader and Securities Trader Principal Registration Categories, 80 Fed. Reg. 53,369 (Sept. 3, 2015); *see also* Press Release, U.S. Sec. & Exch. Comm’n, SEC Proposes Rule to Require Broker-Dealers Active in Off-Exchange Market to Become Members of National Securities Association (Mar. 25, 2015), <http://www.sec.gov/news/pressrelease/2015-48.html>; *see also* Andrew Ackerman, *SEC Rules Would Boost Oversight of High-Frequency Firms*, WALL ST. J. (Mar. 26, 2015); *see generally* Exemption for Certain Exchange Members, 80 Fed. Reg. 18036 (proposed Apr. 2, 2015).

51. *See, e.g.*, H.R. 2292, 113th Cong. (2013); S. 410, 113th Cong. (2013); H.R. 800, 113th Cong. (2013); H.R. 4413, 113th Cong. (2014).

52. Market Access Rule, 17 C.F.R. § 240.15c3-5 (2010). The Market Access Rule is commonly referred to as “Rule 15c3-5.”

53. *Risk Management Controls for Brokers or Dealers with Market Access*, 75 Fed. Reg. 69,792, 69,795 (Nov. 15, 2010). Such controls and procedures must: “[s]ystematically limit financial exposure; comply with appropriate regulations; prevent entry of orders exceed-

access in order to trade on a platform under the broker's "market participant identifier" ("MPID") without the substantive involvement of the broker.⁵⁴ Brokers are incentivized to allow such advanced access because the additional trading brings liquidity and revenue to their pools. The Market Access Rule imposes supervisory obligations on the brokers—attempting to prevent unregistered traders from gaining unfettered and unsupervised 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."⁵⁵

The *Wedbush* and *Facebook IPO* enforcement actions below suggest that brokers must be careful in their management of HFTraders' powerful algorithms and vigilant in their role as market gatekeepers.

*In the Matter of Wedbush Securities ("Wedbush")*⁵⁶

The SEC's action against Wedbush Securities in June 2014 is one example of an HFT firm caught in the crosshairs of the Market Access Rule. After conducting an investigation, the SEC concluded that Wedbush failed to establish or impose any of the safeguards required by the Market Access Rule, and as a result, HFTraders used Wedbush's MPID to execute illegal trades. These trades were completed because the firm allowed trade activity that "did not flow through any Wedbush systems before reaching . . . trading venues."⁵⁷ Wedbush ultimately agreed to pay a \$2.44 million penalty and agreed to retain an independent consultant to ensure future compliance with the Market Access Rule.⁵⁸

ing pre-set credit or capital thresholds; prevent entry of orders that appear to be erroneous; ensure pre-trade compliance checks pass; prevent restricted broker/dealer or customers from trading; prevent unauthorized access to systems; ensure surveillance personnel receive immediate post-trade execution reports; and be kept in accordance with Rule 17a-4(e)(7) under the Exchange Act . . ." *An Overview and Summary of the Market Access Rule* (SEC Rule 15c3-5), BETTER LIVING THROUGH CONCURRENCY (Nov. 21, 2013), <http://clark.ws/2013/11/21/an-overview-and-summary-of-the-market-access-rule-sec-rule-15c3-5>.

54. *Risk Management Controls for Brokers or Dealers with Market Access*, 75 Fed. Reg. 69,792, 69,793 (Nov. 15, 2010).

55. *Id.* at 69,792.

56. *In re Wedbush Sec. Inc.*, SEC Admin. Proceeding No. 3-15913 (June 6, 2014), <http://www.sec.gov/litigation/admin/2014/34-73652.pdf>; see also Press Release, U.S. Sec. & Exch. Comm'n, SEC Penalizes Morgan Stanley for Violating Market Access Rule (2014), <http://www.sec.gov/News/PressRelease/Detail/PressRelease/1370543668817> (last visited Sep. 21, 2015) (announcing SEC's recent penalization of Morgan Stanley for similar violations to the market access rule).

57. *In re Wedbush Sec. Inc.*, SEC Admin. Proceeding No. 3-15913, at *2.

58. *Wedbush Securities and Two Officials Agree to Settle SEC Case* (2014), <http://www.sec.gov/News/PressRelease/Detail/PressRelease/1370543504806> (last visited Sep. 21, 2015).

In the Matter of the NASDAQ Stock Market (“Facebook IPO”)

The SEC levied more fines after a Facebook IPO that began in confusion and ended in disaster. Due to a “technical error” in NASDAQ’s operating system,⁵⁹ chaos ensued when the exchange’s infrastructure could not keep pace with the would-be traders of the stock. When the dust settled, it became clear that NASDAQ’s system had been unprepared for the speed and volume of activity the IPO drew. NASDAQ rectified the glitch within twenty minutes after opening, but many of the earlier orders were cancelled, filled at higher prices, or otherwise modified to the traders’ detriment. In addition to having unprepared systems, NASDAQ and Facebook also violated the Market Access Rule during the IPO.⁶⁰ The SEC chalked up the event to “poorly designed systems and hasty decision-making” and swiftly fined NASDAQ \$10 million.⁶¹

HFT-related errors and negligence can have large-scale market ramifications. These cases show how regulators are quick to punish trading platforms when poorly facilitated HFT activity causes visible market instability. To be fair, there are limited opportunities for these platforms to perform “quality control” tests on HFT algorithms during the trading process. The Market Access Rule is one regulatory measure designed to give some of the responsibility for quality control to the brokerage firms providing otherwise unchecked access to HFTraders, but it is uncertain whether the Rule can do enough to effectively alleviate the burden on trading platforms.

ii. Market Manipulation

Market manipulating strategies are prohibited by a number of existing securities laws.⁶² However, enforcement actions against market manipulators are relatively uncommon. The challenge in bringing such actions is that it can be very difficult to distinguish between HFT market strategies that are competitive and those that are manipulative.⁶³

59. Julianne Pepitone, *Facebook IPO: What the %\$#! happened?*, CNN MONEY (May 23, 2012), <http://money.cnn.com/2012/05/23/technology/facebook-ipo-what-went-wrong>.

60. Jacob Bunge, *Nasdaq to Pay \$10 Million Over Handling of Facebook*, WALL ST. J. (May 29, 2013), <http://www.wsj.com/articles/SB10001424127887324866904578513230892221350> (“Nasdaq violated its own rules [by taking a large, and ultimately profitable,] short position to help address the problems with the debut . . . Other rules also were broken, including the proper ordering of trades, a basic principle of U.S. exchanges [and a requirement of the Market Access Rule].”). In addition to the SEC’s fine, NASDAQ also paid \$62 million in compensation to the brokers who took losses during Facebook’s IPO.

61. *Id.* (quoting George Canellos, co-director of the SEC’s division of enforcement).

62. The charges in *Athena* were brought under Section 10(b)(5) of the Exchange Act. Section 9 of the Exchange Act also prohibits manipulation of security prices. Securities and Exchange Act of 1934, 17 C.F.R. § 240.10b-5 (2012).

63. Fischel and Ross’s definition of manipulation might be of some assistance in carving carefully between the two descriptors (in HFT settings). Manipulation, in a legal sense, might be found in “profitable trades made with ‘bad’ intent,” where (1) the trading is intended to move prices in a certain direction, (2) the trader has no belief that the prices would move in

In the Matter of Athena Capital Research (“Athena”)

In *Athena*,⁶⁴ the SEC found that an HFT firm, Athena Capital Research, was illegally manipulating end-of-day market clearing prices.⁶⁵ Athena structured a trading strategy over the last ten minutes of the trading day that used its HFT capabilities to artificially drive up the closing price of a stock. Using this strategy, Athena was able to sell large positions at inflated prices. Athena eventually paid a \$1 million fine to atone for its malfeasance.

United States v. Coscia (“Coscia”)

In a rare criminal case, a U.S. Attorney’s Office filed criminal charges against a HFTrader, Michael Coscia, for multiple counts of commodity fraud and spoofing.⁶⁶ Coscia devised HFT programs that would place misleading quote orders and then execute trades on the opposite side of those orders after the market reacted to the false orders. Coscia’s program was designed to immediately cancel any of the spoofed orders if they were filled.⁶⁷

These cases illustrate that regulators in the U.S. generally only step in when market participants cross existing legal boundaries. These enforcement actions are not novelties in capital market regulation; the novelty is that they target HFTraders. While current securities laws impose some restrictions on HFT, a technological revolution like HFT should be accompanied by prudent and decisive changes to the market structure. The next section will discuss the response of foreign regulators to such a challenge.

B. Implementing MiFID II in the European Union

In October 2014, the European Parliament formally adopted a revised version of its Markets in Financial Instruments Directive (“MiFID II”) that will go into effect in each member state in January 2017. MiFID II is a legislative framework for European Union (“EU”) member states’ regulation of financial instrument trading and includes new HFT-related provisions.⁶⁸

this direction but for the trade, and (3) the resulting profit comes solely from the trader’s ability to move prices and not from his possession of valuable information. David R. Fischel & David J. Ross, *Should the Law Prohibit “Manipulation” in Financial Markets?*, 105 HARV. L. REV. 503, 510 (1991).

64. *In re Athena Capital*, SEC Admin. Proceeding No. 3-16199, at *5 (Oct. 16, 2014), <http://www.sec.gov/litigation/admin/2014/34-73369.pdf>.

65. *Athena* was settled only after five years of investigation and the discovery of smoking gun emails. See *In re Athena Capital*, at *3 (quoting emails between Athena managers cautioning each other to “make sure we don’t kill the golden goose” and referring to their secret strategy as “meat and gravy”).

66. Indictment, *United States v. Coscia*, No. 14-CR-551, 2015 U.S. Dist. LEXIS 50344 (N.D.I.L. 2014 Apr. 16, 2015), available at http://www.justice.gov/sites/default/files/usao-ndil/legacy/2015/06/11/pr1002_01a.pdf [hereinafter *Coscia Indictment*]; Harris & Leising, *supra* note 39.

67. *Coscia Indictment* at *6.

68. See *Markets in Financial Instruments Directive II*, FIN. CONDUCT AUTH., <https://www.fca.org.uk/firms/markets/international-markets/mifid-ii> (last visited Oct. 11, 2015).

MiFID II guidelines require HFTraders to test and monitor algorithms and to have procedures in place to minimize the risk that their automated trading activity leads to market abuse. MiFID II also requires HFTraders to register and gain authorization to use HFT techniques, as well as to abide by new trading regulations like a harmonized “tick size regime.”⁶⁹

A “tick size” is the increment in which stocks can be traded, such as one cent (\$7.00, \$7.01, \$7.02) or one-eighth (\$7.00, \$7.125, \$7.25). Prior to MiFID II, EU regulators allowed exchanges to set minimum tick sizes to their own preferences; such a system, however, led trading platforms to compete for trader affection by lowering their tick sizes.⁷⁰ MiFID II resolves concerns about this race to the bottom by allowing the European Securities and Markets Authority to draft tick size standards that are reflective of “the price of a financial instrument but also calibrated in a way [to] reflect the liquidity profile of a financial instrument and the average bid-ask spread.”⁷¹ In essence, the EU tick size will be flexible to the price range of individual stocks in order to strike a balance between a tick size so small that traders compete solely on price and a tick size so large that traders compete solely on speed.⁷² Policymakers state that, through changes like tick size harmonization, MiFID II will “level[] the playing field” to bring fairness to the markets.⁷³

1. United Kingdom

The London Stock Exchange (“LSE”) is the largest European exchange.⁷⁴ The Financial Conduct Authority (“FCA”), an independent non-governmental body that replaced the former Financial Services Authority, has regulated the LSE and the British financial services industry since April 2013. In regulating the LSE, the FCA pursues the statutory objectives of

69. Council Directive 2014/65 arts. 48, 49, 2014 O.J. (L 173/349) (EU). Article 49 states that tick sizes must be “calibrated to reflect the liquidity profile of the financial instrument in different markets” and individually adapted to each financial instrument; see Mark Buchanan & Liesbeth Baudewyn, *Trade Size Changes Coming to Europe*, CREDITSUISSE (Oct. 2, 2014).

70. GOV'T OFFICE FOR SCI., *Tick Size Regulation: Costs, Benefits, and Risks* 3 (Aug. 31, 2012) (U.K.), available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289037/12-1068-eia7-tick-size-regulation-costs-benefits.pdf.

71. Sandra Bramhoff, *Impact of Regulation : MiFID II – Tick Sizes*, BEST EXECUTION, <http://www.bestexecution.net/viewpoint-impact-regulation-mifid-ii-tick-sizes-sandra-bramhoff> (last visited Oct. 11, 2015).

72. See *id.*

73. See Nis Jul Clausen & Karten Engisig Sorensen, *Reforming the Regulation of Trading Venues in the EU Under the Proposed (MiFID II) – Leveling the Playing Field and Overcoming Market Fragmentation?* 5 (Nordic & European Company Law, Working Paper No. 10-23, 2012), <http://ssrn.com/abstract=2021079>.

74. See *Top 10 Stock Exchanges in the World*, WORLD STOCK EXCHS., <http://www.world-stock-exchanges.net/top10.html> (last visited Oct. 11, 2015).

protecting consumers, maintaining and promoting effective market competition, and preventing unlawful behavior in the financial markets.⁷⁵

In contrast to the relatively cautious American attitude towards HFT, the United Kingdom (“UK”) seems to encourage HFT activity.⁷⁶ The UK’s 2012 Treasury report recommended against many of the regulatory strategies adopted in the U.S.⁷⁷ While the report acknowledged that some changes (like circuit breakers or minimum tick sizes) would likely increase market stability, it cautioned against potential regulation involving minimum resting times, cancellation fees, changes to maker-taker models, or switching to call markets.⁷⁸

In 2013, the FCA showed a rare burst of action in fining Michael Coscia—the HFTrader charged with spoofing in *United States v. Coscia*—for placing false orders on a British exchange.⁷⁹ The FCA explained that the unprecedented penalty reflected the severity of the “impact and nature of the market abuse.”⁸⁰

British industry participants and lawmakers have pushed back on MiFID II’s restrictive approach,⁸¹ preferring the current regulatory structure, which is a combination of exchange-led monitoring and industry reporting.⁸² While some in the UK resist any new HFT restrictions, however, MiFID II’s imminent arrival has forced them to look for new policies that balance UK objectives with MiFID II compliance.⁸³ The FCA’s Director of Markets, David

75. Financial Services Act 2012, c. 21, §§ 1A-1E (Eng.).

76. The CEO at the FCA described the regulatory approach to present in the UK as “technology neutral,” adding that “it is important to take a step back, and reflect on automated trading coolly and not get carried away by headlines.” Wheatley, *supra* note 7.

77. See GOV’T OFFICE FOR SCI., *The Future of Computer Trading in Financial Markets* 15 (Oct. 23, 2012) (U.K.), available at <http://www.bis.gov.uk/assets/foresight/docs/computer-trading/12-1086-future-of-computer-trading-in-financial-markets-report.pdf>.

78. See *id.* at 13-14.

79. Huw Jones & John McCrank, *U.S. and UK fine high-speed trader for manipulation*, REUTERS (July 23, 2013), <http://in.reuters.com/article/2013/07/22/us-britain-fca-hft-idINBRE96LOG620130722>.

80. *Final Notice to Michael Coscia*, FIN. CONDUCT AUTH., <https://www.fca.org.uk/static/documents/final-notices/coscia.pdf> (last visited July 22, 2015).

81. Much of this pushback can be found in the House of Lords’ EU Economic and Financial Affairs Sub-Committee’s oral and written evidence report entitled *Getting it Right for the City and EU Financial Services Industry*. 12 June 2012, Parl Deb HL (5th ser.), available at <http://www.publications.parliament.uk/pa/ld201213/ldselect/ldecom/28/28.pdf>. In this report, academics and market leaders argue against a number of MiFID II provisions—such as increasing market-making obligations of HFT liquidity providers and regulator-determined, instead of exchange-set, order-to-trade ratios—and articulate a more general belief that MiFID simply “does not understand what high-frequency trading is.” *Id.* at 9.

82. Wheatley, *supra* note 7 (noting the MiFID II-driven changes to come, including significantly reducing lit-pool equities trading and preparing the industry for the increased regulatory oversight of previously unregulated financial instruments).

83. See *id.*; see also David Lawton, Dir. of Markets, Fin. Conduct Auth., Address at the FCA MiFID II Conference 2014 (Sept. 19, 2014) (“[I]mportant questions remain about how this is done, and in particular how to increase transparency without reducing liquidity – the

Lawton, summarized the UK's trajectory in a speech to his countrymen: "[W]e have to now develop a balanced regime that doesn't throw our markets back into the technological dark-ages, but ensures they are fair and safe for all users in the future."⁸⁴

2. Germany

Unlike the UK's slow acceptance of MiFID II, Germany has readily embraced the future of more restrictive HFT regulation. In May 2013, the German Financial Supervisory Authority ("BaFin") passed the progressive High-Frequency Trading Act ("HFTA" or "*Hochfrequenzhandelsgesetz*"). HFTA closely tracks the EU provisions in MiFID II and aims to bring Germany's antiquated financial market into the modern electronic age. Market analysts and observers consider it to be stricter and more comprehensive than other HFT-targeted national regulations.⁸⁵

While much of HFTA is in line with the MiFID II's requirements, it also contains elements that distinguish it from other HFT legislation, such as increased supervisory requirements, excessive order fees, and minimum tick sizes.⁸⁶

Pursuant to HFTA, BaFin now requires the registration of HFTraders, which are defined as traders that use latency-reducing infrastructure, automated order decision-making and execution, high trading and order volume, and proprietary trading.⁸⁷ As of late 2014, no firm had applied for an HFT license in Germany.⁸⁸ This occurrence is indicative of one of two conclusions—either no trading participant met the BaFin criteria for an HFT firm, or, more likely, firms matching the BaFin criteria have changed their trading behavior or left for less regulated markets to avoid the registration requirement.⁸⁹

granularity of application of the rules, the calibration of thresholds for large in scale, and publication delays and the definition of 'liquid' instruments are key components of the thinking that must now be done.").

84. Lawton, *supra* note 83.

85. See Germany's HFT 'Solution' Should Be Adopted by MiFID II, Says Prop Trading Group, MARKETS MEDIA (Sept. 18, 2012), <http://marketsmedia.com/germanys-hft-solution-should-be-adopted-by-mifid-ii-says-prop-trading-group>; Christian Voigt, *What You Need to Know Before Buying a German Car*, REGULATION MATTERS (Oct. 2, 2012), <http://regulation.fidessa.com/2012/10/02/what-you-need-to-know-before-buying-a-german-car>.

86. See Hochfrequenzhandelsgesetz [High Frequency Trading Act] §§ 2(d), 17, 26(b) (2014), http://www.bafin.de/SharedDocs/Aufsichtsrecht/EN/Gesetz/hft_en.html?nn=2821360#Start.

87. *Id.* at § 2(a)(4)(d).

88. Martin Haferkorn & Kai Zimmermann, *The German-High Frequency Trading Act: Implications for Market Quality 3* (Goethe University Frankfurt Paper, 2014), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2514334.

89. *Id.*

C. Japan

The Japanese financial market has welcomed the growth of HFT with open arms. In 2010, the Tokyo Stock Exchange introduced “Arrowhead,” a high-speed trading system.⁹⁰ Two years later, a merger between Japan’s two major stock exchanges gave Japan title to the third largest exchange in the world.⁹¹ In 2014, Japan built high-speed trading routes between Tokyo, Singapore, and Chicago to facilitate the growth of HFT.⁹²

Similar to the U.S., Japan regulates exchanges and prohibits fraudulent transactions like market manipulation and insider trading.⁹³ Though Japan holds HFTraders accountable under existing securities regulation, scholars doubt the functional enforceability of such regulation.⁹⁴ Japan may be less concerned about the dangers of HFT than the EU and U.S. because HFT strategies are simply less effective in the Japanese equity market.⁹⁵ The stock exchange merger in 2012 left Japan with essentially one exchange, resulting in an environment that lacks the fragmentation so profitably exploited by HFTraders in other markets.⁹⁶

D. China and Hong Kong

Although HFT is not explicitly banned by China or Hong Kong, the major stock exchanges in those jurisdictions are among the least HFT-friendly in the world.⁹⁷ Hong Kong traders are bound by a large stamp duty (*i.e.* a 0.1% tax on the sale or purchase of stocks) that renders HFT prohibitively expensive.⁹⁸ In China, government regulators have tried to curb speculative trading by banning day-trading (*i.e.* purchasing and selling a stock

90. *HFT Comes to Japan*, MARKETSMEDIA (May 16, 2013), <http://marketsmedia.com/hft-comes-to-japan>.

91. Masaaki Iwamoto & Toshiro Hasegawa, *Tokyo Exchange Merges With Osaka to Form World’s No. 3*, BLOOMBERG (July 15, 2013), <http://www.bloomberg.com/news/articles/2013-07-15/tokyo-exchange-merges-with-osaka-to-form-world-s-no-3>.

92. Holly Bell & Harrison Searles, *An Analysis of Global HFT Regulation: Motivations, Market Failures, and Alternative Outcomes* 19 (Mercatus Center, Working Paper No. 14-11, 2014), http://mercatus.org/sites/default/files/Bell_GlobalHFTRegulation_v2.pdf.

93. Nicole J. Ramsay, *Japanese Securities Regulation: Problems of Enforcement*, 60 *FORDHAM L. REV.* S255, S256-57 (1992).

94. *Id.* at S255 (contending that “[a]lthough the securities regulations in Japan are vast and broad, enforcement problems still remain.”).

95. See Yuji Nakamura & Toshiro Hasegawa, *Humans Lose Out as Robots Take Tokyo Stock Exchange*, BLOOMBERG (Mar. 4, 2015), <http://www.bloomberg.com/news/articles/2015-03-05/robots-take-tokyo-as-high-frequency-equity-infiltration-hits-70>.

96. *Id.*

97. See Bell & Searles, *supra* note 92, at 20-23.

98. Stamp Duty Ordinance, (2014) Cap. 117, 1, Sched. 1, Head 2 (H.K.), available at [http://www.legislation.gov.hk/blis_pdf.nsf/6799165D2FEE3FA94825755E0033E532/90E292D8C26F596C482575EE003E6865/\\$FILE/CAP_117_e_b5.pdf](http://www.legislation.gov.hk/blis_pdf.nsf/6799165D2FEE3FA94825755E0033E532/90E292D8C26F596C482575EE003E6865/$FILE/CAP_117_e_b5.pdf).

within the same day) and by prohibiting daily cancellations of more than 1000 orders.⁹⁹ These policies make profitable HFT impossible.

Recently, however, China has shown willingness to engage in international trading with foreign capital through the creation of the Shanghai-Hong Kong Stock Connect—an unprecedented pipeline allowing investors in Hong Kong to trade “directly”¹⁰⁰ with investors in China.¹⁰¹ Regardless, the de facto HFT ban currently remains in place for both China and Hong Kong. Insiders such as Alexa Lam, former Deputy CEO of the Hong Kong Securities and Futures Commission, however, predict that China will alter its regulatory structure to accommodate HFT in the future—a trajectory Hong Kong will likely follow.¹⁰²

III. DOMESTIC AND TRANSNATIONAL REGULATORY HFT REFORM

Just like the U.S. macroeconomy, all of the securities markets operate within a “structure” of rules, technology, market practices, and other constraints that establish the boundaries for interactions between buyers and sellers.

It is important to recognize that this “structure” does not just mean regulation, but also the much more complex interaction among regulation and other factors like competition and technology. . . .

[O]ur work on market structure is never finished – the speed with which technology and markets change makes that impossible – instead, we must always be focused on what in our market structure can be improved for the benefit of investors and companies.¹⁰³

The varied approaches of financial regulators across the globe show that regulators understand that HFT, similar to technological advances that have

99. *China Rising: Innovation and Growth in Its Markets*, AUTOMATED TRADER (2012) at 89, available at <http://www.automatedtrader.net/articles/sponsored-articles/137325/china-rising-innovation-and-growth-in-its-markets>.

100. “Directly” is not literal because the nature of the Stock Connect’s directness is relative to previous prohibition of cross-border trades. The pipeline is not perfectly direct because trades must pass through clearinghouses on both sides of the China-Hong Kong border before entering the apposite exchange.

101. See generally Saikat Chatterjee & Michelle Chen, *China ETFs Shriveled as Shanghai-Hong Kong Stock Link Heats Up*, REUTERS (Apr. 23, 2015), <http://www.reuters.com/article/2015/04/23/china-etf-idUSL4N0XK1TO20150423>.

102. Interview with Alexa Lam, former Deputy Chief Exec. Officer, H.K. Sec. & Futures Comm’n (Apr. 15, 2015); see also Amy Li, *Shanghai to Trial Same-Day Trading*, WALL ST. J. (Nov 11, 2014), <http://blogs.wsj.com/moneybeat/2014/11/11/shanghai-to-trial-same-day-trading> (discussing the SSE’s forthcoming rescission of the “T + 1 trading rule” to more closely align Chinese equity markets with modern international practices).

103. Mary Jo White, Chair, SEC, Speech at the Economic Club of New York: Intermediation in the Modern Securities Markets: Putting Technology and Competition to Work for Investors (June 20, 2014), available at <http://www.sec.gov/News/Speech/Detail/Speech/1370542122012>.

changed many traditional industries, is here to stay. It is equally clear that there is little agreement on how to properly regulate HFT. This Section proposes a two-part solution that aims to embrace the advantages of technology in the financial industry and unify transnational regulation to create a truly global market.

A. Implementing Domestic Reforms

As many nations have already concluded, abolishing HFT outright is an inadvisable route. In the face of crippling regulation, HFTraders might simply move to friendlier waters (so long as they exist) and take their liquidity with them. The next section discusses how the structure of the market should be changed to best minimize HFT-related market instability while retaining HFT market benefits.

1. Curtailing the “Race to Zero”: Realigning Incentives to Balance Price and Speed

Currently, the fastest HFTraders are the most profitable. This reality has resulted in the “race to zero”—the goal of continually reducing latency to the universe’s natural limits.¹⁰⁴ Although scholarly research has yet to provide conclusive proof that HFTraders with speed-based incentives harm the market, recent experience with market volatility suggests otherwise¹⁰⁵ If, however, HFTraders could be incentivized to trade on the best prices, the risks of market harm would likely diminish. This section explores several potential policy changes that would refocus incentives to best-price trading.

i. Implementing Variable Tick Sizes

Regulators and exchanges set tick sizes for the purposes of simplifying the trading process, lowering transaction costs, and promoting liquidity. Originally, U.S. equity markets traded in eighths—\$0.125. Exchanges first “broke the eighth” by transitioning to a sixteenths trading structure in

104. See Andrew G. Haldane, Exec. Dir., Fin. Stability of the Bank of England, Address at the International Economic Association Sixteenth World Congress: Race to Zero (July 8, 2011), available at <http://www.bis.org/review/r110720a.pdf> (noting that zero latency will be reached when trading converges “on its natural (Planck’s) limit, the speed of light”); see also Patterson, *supra* note 16.

105. Scholars come out on both sides of this debate. Compare Elaine Wah & Michael P. Wellman, *Latency Arbitrage, Market Fragmentation, and Efficiency: A Two-Market Model* 12 (Feb. 12, 2013), <http://web.eecs.umich.edu/srg/wp-content/uploads/2013/02/twomarketmodel.pdf> (discussing the harmful effects of latency arbitrageur), with Joel Hasbrouck & Gideon Saar, *Low-latency trading*, 16 J. FIN. MARKETS 646 (2013) (concluding that “low-latency activity need not work to the detriment of long-term investors”). See also Mark Buchanan, *High-Frequency Traders Need a Speed Limit*, BLOOMBERG (Jan. 25, 2015), <http://www.bloombergview.com/articles/2015-01-25/high-frequency-traders-need-a-speed-limit>.

1997,¹⁰⁶ and in 2001, the equity market switched to “decimalization,” or penny pricing. The SEC promulgated Reg NMS in 2005 as a way to modernize the market. Reg NMS Section 612’s “sub-penny rule” imposes a minimum tick size of one cent, meaning that the tick size cannot be smaller than a penny.¹⁰⁷ There have been calls within the U.S. markets to change the sub-penny rule by increasing or decreasing the minimum tick size, or removing the minimum altogether.¹⁰⁸

The nascent EU approach should be carefully considered as a model for domestic tick size reform. The MiFID II directive dictates that tick sizes must be flexible to appropriately match the price ranges of individual stocks.¹⁰⁹ A standard tick size of one cent might be too large for a \$1 share (leaving traders to compete solely on speed) and too small for a \$500 share (resulting in competition solely on negligible price differences). Though this approach would be more complicated to implement than the sub-penny rule, once in place it would not be difficult to maintain.

ii. Moving from a Continuous Market to a Call Market

In a continuous market, a trader can buy or sell stocks at any instant during the trading day.¹¹⁰ Because trades are executed in the order they enter the market, faster traders can advantage their position through technical arbitrage. Equity markets trade on a continuous market design where trades are made on a rolling basis, first at the best price and then in the order they are received.¹¹¹ When matching buy and sell orders, exchanges must check other trading platforms to ensure each order trades at its best price.¹¹² Because this

106. Though Congress’s “Common Cents Pricing Act of 1997” bill unsuccessfully sought to establish the penny as the price increment in the U.S. stock market, it served as the impetus for the NYSE to finally switch from eighths to sixteenths—the last major exchange to do so.

107. Reg. NMS, 70 Fed. Reg. at 496.

108. Compare Chen Yao & Mao Ye, *Tick Size Constraints, High-Frequency Trading, and Liquidity* (Jan. 15, 2015), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2478216 (arguing that a decrease in tick size will better allow non-HFTs to compete with HFTs on price), with David Weild et al., *The Trouble With Small Tick Sizes* (Sept. 2012), available at http://www.granthornton.com/staticfiles/GTCom/Public%20companies%20and%20capital%20markets/Trouble_Small_Ticks.pdf (contending that high tick sizes would provide adequate economic incentives will bring back the small IPO and generally boost the economy). See also David Weild et al., *The Trouble With Small Tick Sizes* (Sept. 2012) (suggesting issuers of stock have the authority to completely customize the tick size with which it is traded).

109. Article 49 of MiFID II.

110. Eric Budish, Peter Cramton & John Shim, *The High-Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response 1* (Chicago Booth Paper No. 14-13, 2013), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2478216.

111. *Id.* at 10.

112. Regulation NMS dictates that price is the most important consideration in a trade. This assertion is gleaned through the “trade-through rule,” because an order submitted to the market must pass through the various trading platforms until it meets the best price available, subject to some exceptions. The effect of this rule is that investors can no longer execute trades

“check and match” activity does not occur instantaneously, a window opens for HFTraders with lower latency to practice arbitrage. If an order hits one platform and does not find the best price, it must quickly bounce to the others. While the order checks other exchanges, efficient HFT arbitrageurs can quickly purchase that stock at the very best price and turn it around in a sale at the next best, slightly higher price. This arbitrage has the effect of inflating the stock price for the original buy order, which has to complete its order at that next best price.

One mechanism for disrupting the race to zero would be to switch from a continuous market to a call market. In a call market, market-wide orders would be executed in batches at fixed intervals.¹¹³ As a consequence, all of the orders placed during the finite clearing intervals can be more effectively matched on price before execution.¹¹⁴ By eliminating the value of a microscopic speed advantage, such a structure would focus competition on price, and give traders time to react to the environment and informational cues within the call period.¹¹⁵ Call markets with batch execution are also computationally simple for exchanges—and thus easy to implement—because each batch can be computed in a designated block of time.¹¹⁶

To discourage traders from attempting to game the batch system, each batch could be executed at random intervals within pre-determined limits (*e.g.* between 25 and 50 microseconds).¹¹⁷ A short batch interval would still reward technological investment that results in an ability to respond quickly to new information and market shifts while negating the more predatory uses of low latency strategies.¹¹⁸

If regulators impose a call market design on equity market trading, some uncertainty will remain as to how a call market exchange would function alongside continuous markets or other exchanges.¹¹⁹ While it would be sim-

at an inferior price for any reason, including: certainty of execution, preference of exchange, non-displayed liquidity, available capital at a broker-dealer, or concerns about confidentiality. See Marshall E. Blume, *Competition and Fragmentation in the Equity Markets: The Effects of Regulation NMS 11* (Rodney L. White Ctr. for Fin. Research, Paper No. 02-07, 2007), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=959429.

113. See Budish et al., *supra* note 110, at 1, for a full study on the potential benefits of switching from a continuous order system to a frequent batch auction market. See also Wah, *supra* note 17.

114. See Wah & Wellman, *supra* note 105, at 3.

115. Budish et al., *supra* note 110, at 46, 50.

116. *Id.* at 55 (noting that, in contrast, the existing continuous limit order books design must be computed on a rolling basis as orders are executed on a continuum – leading to potential backlog and delay).

117. See Ginger Szala, *Will High Frequency Trading Force a Market Redesign?*, ADVANTAGE FUTURES, (July 10, 2014) <http://www.advantagefutures.com/will-high-frequency-trading-force-a-market-redesign>.

118. *Id.*

119. See Sviatoslav Rosov, *Are Frequent Batch Auctions a Solution to HFT Latency Arbitrage?*, CFA INSTITUTE BLOG, (Nov. 10, 2014), <http://blogs.cfainstitute.org/marketintegrity/2014/11/10/are-frequent-batch-auctions-a-solution-to-hft-latency-arbitrage>.

ple to bypass this problem and require all exchanges to use frequent batch auctions, this solution would be difficult for regulators to impose and would certainly be more well-received if it were voluntarily adopted by the industry. Such a system might be less disruptive if phased in slowly, rather than adopted in full simultaneously.

Whether adopting a call market or retaining a continuous one, regulators could implement an additional policy that allows for order bundling. Order bundling lets traders place large orders that must be fulfilled across multiple exchanges in such a way that no partial execution of that order is published until the whole order is complete, effectively preventing HFT order anticipation.¹²⁰

2. Transaction Taxes or Fees

Another potential method of reigning in HFT would be the imposition of a transaction tax.¹²¹ An effective tax could place beneficial restraints on HFT—by curbing speculative trading, reducing market volatility—while also raising revenue. As seen in Hong Kong, however, a heavy transaction tax could eliminate HFT altogether.

One option would be a very small transaction tax. Economist James Tobin, who first proposed a financial transaction tax in 1978, likened the effects of such a tax to “throw[ing] some sand in the wheels of our excessively efficient international money markets.”¹²² The benefits of implementing a transaction tax would be: (1) uniformity across trading platforms and (2) the elimination of the exchanges’ tax exemption loopholes.¹²³ Ideally, such a tax would push investors towards developing genuine long-term investment strategies, rather than short-term speculative strategies.¹²⁴

120. Adler, *supra* note 36, at 197.

121. See Matt Prewitt, *High-Frequency Trading: Should Regulators Do More?*, 19 MICH. TELECOMM. & TECH. L. REV. 131, 160 (2012); Algirdas Šemeta, EU Commissioner for Taxation, Customs Union, Anti-Fraud, Audit and Statistics, Address at the Meeting of Members of the Finance and Fiscal Committees in the Danish Parliament: Financial Transactions Tax: The Way Ahead (Mar. 19, 2012); see also Jared Bernstein, *The Case for a Tax on Financial Transactions*, N.Y. TIMES (July 22, 2015), <http://www.nytimes.com/2015/07/22/opinion/the-case-for-a-tax-on-financial-transactions.html>.

122. James Tobin, *A Proposal for International Monetary Reform*, 4 E. ECON. J. 153, 154 (1978).

123. The latter consideration is especially important because exchanges often build exemptions into their fee structures that favor their largest traders under the guise of building a fairer market. For example, NASDAQ exempts market makers from its Excessive Order Fee under the auspices that “market makers are already subject to rule-based standards designed to promote the efficiency and quality of their order entry practices.” Nasdaq SEC Proposed Rule Change Filing, No. 34-70117, 6 n.10 (Aug. 5, 2013), available at <http://www.sec.gov/rules/sro/nasdaq/2013/34-70117.pdf>.

124. See John Fullerton, *High-frequency Trading is a Blight on Markets that the Tobin Tax Can Cure*, THE GUARDIAN: ECONOMICS BLOG (Apr. 4, 2012, 7:42 AM), <http://www.theguardian.com/business/economics-blog/2014/apr/04/high-frequency-trading-markets-tobin-tax-financial-transactions-algorithms>.

While implementing a transaction tax could curb speculation, it would likely have a negative impact on market liquidity. Italian financial authorities have promulgated a version of a “Tobin Tax.”¹²⁵ The Italian HFT tax is only collected when the ratio of cancelled to executed orders exceeds 60 percent in a trading day,¹²⁶ yet still a number of Italian firms relying on HFT have found the tax to be negatively impactful on their trading operations.¹²⁷ Critics warn that this Italian field experiment is evidence that even a well-intentioned transaction tax could hinder market liquidity.¹²⁸

Another option would be to impose a fee on traders who place orders without the intent to execute them. Regulators could infer such intent from the immediate cancellation of large orders or the pricing of orders so far outside of the National Best Bid and Offer range as to be impracticable to trade upon, designating these orders as “impermissible.” Some exchanges, such as NASDAQ, have already imposed such a fee—termed “excessive order fees”—upon their market participants, citing the rationale that “[m]arket participants that flood the market with orders that are rapidly cancelled or that are priced away from the inside market do little to support meaningful price discovery.”¹²⁹ The uniform imposition of such a fee would ostensibly end illicit activities like spoofing and quote stuffing because the submission of large, unexecuted orders would become prohibitively expensive. On the other hand, it could potentially discourage order cancellations that are an innocuous part of normal trading. An experimental use of this fee would allow regulators to determine if cancelled or exorbitantly priced orders are always reflective of market manipulation, without permanently chilling the market.

3. Increasing Obligations for Proprietary Traders

One area ripe for regulatory improvement is the Market Access Rule. As discussed previously, the Market Access Rule directs the SEC and/or

125. France implemented a tax of 0.01% of qualified transactions, while Italy’s tax is 0.05%. Bell & Searles, *supra* note 92, at 24; Vittorio Salvadori di Wiesenho & Roberto Egori, *2013 Italian Financial Transaction Tax*, DERIVATIVES & FINANCIAL INSTRUMENTS 49 (2013), available at <http://www.freshfields.com/uploadedFiles/2013%20Italian%20Financial%20Transaction%20Tax.pdf>.

126. Salvadori di Wiesenho & Egori, *supra* note 125, at 60.

127. Mike O’Hara, *European FFT, German HFT Act, MiFIR, MAR Whats It All About?*, THE TRADING MESH (May 28, 2013, 3:21 AM), <http://www.thetradingmesh.com/pg/blog/mike/read/92444>. Other scholars have also noted the overall decrease in liquidity apparent in both French and Italian markets. Bell & Searles, *supra* note 92, at 38, 41.

128. See Ben Wright, *Call It Whatever You Like, but a Financial Transaction Tax is Bad News*, TELEGRAPH (Sept. 2, 2014), <http://www.telegraph.co.uk/finance/newsbysector/bank-and-finance/11071422/Call-it-whatever-you-like-but-a-financial-transaction-tax-is-bad-news.html>.

129. Order Approving NASDAQ Proposed Rule Change Relating to Routing of Order, Exchange Act Release No. 34-70117 (Aug. 5, 2013), <http://www.sec.gov/rules/sro/nasdaq/2013/34-70117.pdf>.

FINRA to supervise the firm, and the firm, in turn, must supervise the unregistered traders using its MPID.

In addition to FINRA's new registration rules,¹³⁰ regulators could further combat HFT's potential market destabilizing effects by imposing fiduciary-like obligations on all market makers, including proprietary traders using HFT strategies. The judiciary already recognized that market makers must assume special obligations in return for the unprecedented access and power they have within the financial market.¹³¹ Simply placing a fiduciary duty on market makers, however, would be unworkable because proprietary HF-Traders do not have their own customers.¹³²

Instead, HFTraders could be required to hold their positions during periods of market duress, rather than being allowed to immediately exit the market. Studies have found that HFT was not the cause of market disasters like the Flash Crash and the Knight Capital loss.¹³³ HFT has, however, been implicated as a contributor to the sudden and extreme subsequent withdrawal of liquidity from the market in the aftermath of such events.¹³⁴ Without access to liquidity, a quick recovery from a small market hiccup can be stymied, leading to broader market losses. If HFTraders are required to hold positions during times of duress, liquidity will remain in the market and a complete crash might be avoided.¹³⁵

4. Increasing Technological Investment to Enhance Monitoring and Market Transparency

A primary goal articulated by regulators is to increase transparency and oversight within capital markets.¹³⁶ The SEC has taken a step in this direc-

130. See discussion *supra* Part II.A.1.

131. See, e.g., *Chiarella v. United States*, 445 U.S. 222, 234 n. 16 (1980) ("Congress . . . recogni[z]ed that specialists contribute to a fair and orderly marketplace at the same time they exploit the informational advantage that comes from their possession of buy and sell orders."); *Clement v. SEC*, 674 F.2d 641, 643 (7th Cir. 1983) ("In return for undertaking . . . special obligations to the market, market makers enjoy advantages not available to others.").

132. A broker-dealer's standard of care when providing investment advice to investors is governed by FINRA Rule 2111's suitability standard: a broker-dealer is required to "have a reasonable basis to believe that a recommended [security or investment] strategy . . . is suitable for the customer." FINRA R. 2111 (2012).

133. Jeremy Grant & Philip Stafford, *Studies Say No Link Between HFT and Volatility*, FIN. TIMES (Sept. 8, 2011, 1:22 PM), <http://www.ft.com/cms/s/0/38452490-da07-11e0-b199-00144feabdc0.html#axzz3gdTwf2II>.

134. See Michael Mackenzie & Telis Demos, *Fears Linger of New 'Flash Crash'*, FIN. TIMES (May 5, 2011, 6:23PM), <http://www.ft.com/intl/cms/s/0/d18f3d28-7735-11e0-aed6-00144feabdc0.html#axzz3gdTwf2II>.

135. SECURITIES INDUSTRY & FINANCIAL MARKETS ASSOCIATION, *IMPACT OF HIGH FREQUENCY TRADING AND CONSIDERATIONS FOR CHANGE 4-9* (2011) (outlining increased effect of computer-based trading on extreme market movements during times of market stress due to the sheer volume and speed of algorithmic reactions).

136. SEC, *STRATEGIC PLAN: FISCAL YEARS 2014-2018 3* (2014), <https://www.sec.gov/about/sec-strategic-plan-2014-2018.pdf>.

tion by adopting a rule to create a consolidated audit trail—a data project that will enable regulators to monitor trades and risk on the market in real time.¹³⁷ The rule requires self-regulating organizations—exchanges and members of FINRA—to collect and report market trading data to the SEC.¹³⁸ But while information collection is an important first step, it is worthless if the SEC cannot analyze it effectively.¹³⁹

If a consolidated audit trail is to be meaningful, it must analyze data in real time effectively enough to detect illegal HFT activity and distinguish predatory from competitive tactics. As HFTraders create and update algorithms to respond to the market in real time, the SEC must invest in similarly advanced technology. An obvious difficulty is the expense associated with such technological investment. The building of the SEC's consolidated audit trail alone is estimated to cost between \$350 million and \$1 billion.¹⁴⁰

The solution might be to simply accept that software engineers of such caliber are in high demand and agencies should find a way to offer competitive rates of compensation. If matching these salaries is not feasible,¹⁴¹ agencies could outsource algorithmic engineering. Financial industry insiders working as contractors could be an affordable way for regulators to create and maintain effective monitoring technology.

B. Setting International Standards for HFT

As the national financial markets become increasingly more global, the implications of an uncoordinated approach to HFT regulation grow larger and more far-reaching. By acknowledging the securities market as a global network, perhaps even to the point of being a single financial system, dominant nations like the U.S. might be able to sway newer HFT entrants—such as Russia, Mexico, and China—to adopt basic provisions for automated

137. Consolidated Audit Trail, 77 Fed. Reg. 45,722, 45,722 (2012) (to be codified at 17 C.F.R. pt. 242). In 2010, the SEC also built a program known as MIDAS—"Market Information Data Analytics System." Ahead of the consolidated audit trail, MIDAS is currently utilizing public data to analyze information regarding the orders and trade executions on the national exchanges, as well as all off-exchange executions. See Elisse Walter, Chair, SEC, Speech at American University School of Law: Harnessing Tomorrow's Technology for Today's Investors and Markets (Feb. 19, 2013); but see Letter from R. T. Leuchtkafer to Elizabeth M. Murphy, Secretary of the SEC (May 15, 2014), available at http://blog.themistrading.com/wp-content/uploads/2014/05/Leuchtkafer_MIDAS.pdf (considering MIDAS's limitations, such as only collecting public information, not accounting for canceled trades, etc.).

138. Consolidated Audit Trail, 77 Fed. Reg. 45,722, 45,722 (Aug. 1, 2013) (to be codified at 17 C.F.R. pt. 242).

139. After five months of effort, the SEC was able to piece together trading data needed to understand the events behind the twenty-minute Flash Crash in 2010. The necessary information was at the analysts' fingertips, yet the conclusion was much further away.

140. Scott Patterson & Bradley Hope, *Bidders for SEC's CAT System Narrowed to Six from 10*, WALL ST. J. (July 1, 2014).

141. See Emily Lambert, *High-Frequency Programmers Revolt Over Pay*, FORBES (July 28, 2010).

trading in their national exchanges and off-market platforms. For example, if all HFTraders must register with a financial regulator, there will be fewer incentives for firms to seek friendlier, unregulated waters in other jurisdictions.¹⁴²

Although there are no internationally-shared HFT standards, many nations have common securities regulation goals, such as protecting investors, ensuring that markets are fair, efficient and transparent, and reducing systemic risk.¹⁴³ A set of international standards would encourage national regulators to unify their approaches to HFT regulation, much as the U.S. generally accepted accounting principles (“GAAP”) and the International Financial Reporting Standards (“IFRS”) did for corporate financial reporting.¹⁴⁴

A journey towards global HFT regulation undoubtedly leads to a “who’s in charge of global finance” problem.¹⁴⁵ The International Organization of Securities Commissions (“IOSCO”) is one international regulatory organization that could take the lead on creating a set of global HFT standards. IOSCO has not yet spoken specifically to HFT activity, but it has identified risks of algorithmic trading and recommended ways to minimize such risks. The IOSCO Consultation Report states that trading venues should draft “business continuity plans” incorporating controls for errant algorithmic occurrences, such as pre-trade controls, circuit breakers, and kill switches.¹⁴⁶ IOSCO further advises intermediaries—including clearing firms—to have adequate “operational and technical capabilities” to effectively manage the risks posed by their clients with direct electronic access to the market.¹⁴⁷

Any global regulatory system should first standardize a definition for HFT activity in order to best facilitate effective regulation and monitoring.¹⁴⁸ A standardized global definition would prevent HFTraders from simply fleeing the jurisdiction to avoid the registration requirement (recall the BaFin

142. This is obviously a gross generalization of such a provision’s outcome. Many firms might still look to be registered in other nations with softer regulators or still be incentivized to find a way to be “unmonitored.” The unlimited potential for other outcomes would not be fully realized until a treaty began to be negotiated or discussed.

143. See generally Bell & Searles, *supra* note 92.

144. GAAP are a marriage of policy-driven standards and the set of commonly accepted ways of recording and reporting accounting information. See generally FEDERAL ACCOUNTING STANDARDS ADVISORY BOARD, *Authoritative Sources of Guidance*, <http://www.fasab.gov/accounting-standards/authoritative-source-of-gaap>.

145. See generally Michael Barr, *Who’s in Charge of Global Finance*, 45 GEO. J. INT’L L. 971 (2014) (outlining the challenges in infusing legitimacy and accountability into the global financial regulatory structure).

146. INT’L ORG. OF SEC. COMM’NS, *MECHANISMS FOR TRADING VENUES TO EFFECTIVELY MANAGE ELECTRONIC TRADING RISKS AND PLANS FOR BUSINESS CONTINUITY* 27-34 (2015), available at <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD483.pdf>.

147. *Id.* at 20-23.

148. One option would be adopting the strict European parameters for HFT activity in MiFID II, discussed *supra* in Part II.B.

situation). Next, a global regulatory system should adopt two early measures: stress testing protocols and HFT registration. Global standards should encourage regularly conducted stress testing of trading platforms to ensure that they have the stability to endure algorithmic catastrophes without crashing.¹⁴⁹ Global standards should also outline and standardize HFT firm registration requirements. Though the capital markets would remain a primarily self-regulating industry, required registration would pave the way for supervisory authorities to investigate reports of illicit HFT activity.¹⁵⁰ Setting up an avenue for more effective monitoring will allow regulators to learn more about the effects of HFT and tailor future regulation accordingly.

Above all, global standards need to be flexible to adapt to the evolution of HFT strategies. Broad global standards would work in conjunction with the domestic recommendations in Part III.A to improve the immediate stability of the U.S. capital markets. Implementing call markets or imposing distressed-market obligations on HFT traders would also be effective elements in a set of global HFT principles. Like GAAP and IFRS, a clear set of international standards could evolve as the market learns more about the real impact of HFT and eventually become a set of standards that is uniformly adopted at domestic levels.¹⁵¹

CONCLUSION

Many industry observers caution against an expansive approach to HFT regulation. Proponents tout increased liquidity, lower transaction costs, increased efficiency in price discovery, and smaller spreads as positive ramifications of a HFT-driven market. Critics of HFT have equally plausible concerns regarding HFT activity's negative effects on market integrity, transparency, stability, and fairness.¹⁵²

149. Such stress testing might include the following measures already recommended by IOSCO: (1) doubling the number of orders and executions compared to a regular trading day; (2) doubling the peak volumes observed for a period; (3) tripling the current maximums experienced in current production; (4) testing volume of 130% of volume traded the previous two years; and (5) testing ten times the current trading volume when developing new algorithms and systems. INT'L ORG. OF SEC. COMM'NS, MECHANISMS FOR TRADING VENUES TO EFFECTIVELY MANAGE ELECTRONIC TRADING RISKS AND PLANS FOR BUSINESS CONTINUITY 22 (2015), available at <http://www.iosco.org/library/pubdocs/pdf/IOSCOPD483.pdf>.

150. *But cf.* Nan S. Ellis et al., *The NYSE Response to Specialist Misconduct: An Example of the Failure of Self-Regulation*, BERKELEY BUS. L.J. 102, 145 (2010) (arguing that a system of self-regulation is untenable for effectively managing modern market misconduct).

151. *See generally* Stephen A. Zeff, *Evolution of US Generally Accepted Accounting Principles (GAAP)* (2005), available at <http://www.iasplus.com/en/binary/resource/0407zef-fusgaap.pdf> (outlining the evolution and development of GAAP from the 1930s to present day).

152. *See* Scott Patterson, *Mark Cuban: High-Frequency Traders Are the Ultimate Hackers*, WALL ST. J.: MARKETBEAT (June 26, 2012, 4:42 PM), <http://blogs.wsj.com/marketbeat/2012/06/26/mark-cuban-high-frequency-traders-are-the-ultimate-hackers>; *see also* Bell & Searles, *supra* note 92, at 24.

With studies and pontifications from across the industry supporting both sides of the debate, the conclusion is that the long-term effects of HFT are not yet known. Accordingly, some observers advocate for a hands-off approach to HFT: no HFT-targeted regulation.¹⁵³ Others recommend a conservative “wait-and-see” period before implementing potentially restrictive regulations, hoping to guard against the risk of a regulatory overreaction.¹⁵⁴

The HFT question, however, comes in the wake of a global financial crisis after which regulators and industry participants were criticized for a complete failure to diagnose and react to a brewing storm. Uncertainty as to the effects of HFT in financial markets should not be cited as the reason for declining to adjust market structure and regulation. Regulators have many options for expanding HFT regulation to better protect markets and investors. Regulators must not placidly accept the current market structure as immutable. Instead it should be tested for its flexibility and regularly reworked to better serve a market of evolving technology.

153. See e.g., Tim Worstall, *Adam Smith Explains Why High Frequency Trading Doesn't Need to be Regulated*, FORBES (Mar. 30, 2015, 8:23 AM), <http://www.forbes.com/sites/timworstall/2015/03/30/adam-smith-explains-why-high-frequency-trading-doesnt-need-to-be-regulated>.

154. See Holly Bell, *Beyond Regulation: A Cooperative Approach to High-Frequency Trading and Financial Market Monitoring*, CATO INSTITUTE, 6 (Apr. 8, 2015).