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

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NOTE

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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. The Definition ........................................... 163
   B. The Technology ......................................... 164
   C. The Strategies ........................................... 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. United States ........................................ 169
      1. Legislation and Regulation ....................... 170
      2. Enforcement Actions ............................. 171
         i. Market Access Rule Violations ............... 171
         ii. Market Manipulation ......................... 173
   B. Implementing MiFID II in the European Union ...... 174
      1. United Kingdom ..................................... 175
      2. Germany ........................................... 177
   C. Japan ............................................... 178
   D. China and Hong Kong ............................... 178

III. Domestic and Transnational Regulatory HFT Reform ................................................ 179
   A. Implementing Domestic Reforms ...................... 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. Setting International Standards for HFT .............. 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.  

Everyone has an opinion on HFT. Critics insist it is predatory and systematically fraudulent. Proponents caution that its benefits far outweigh any negative impact it may have on the market. 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, enforcement against high-frequency traders ("HFT-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, likely because there is no singular, definitive HFT strategy. In the U.S., HFT is considered a subset of

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strategies within algorithmic trading—or “[c]omputerized trading controlled
by algorithms.”9 Algorithmic trading is a more general practice within com-
puter-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 lim-
ited to the creation and implementation of the algorithms.10 Within al-
gorithmic trading, HFT strategies are those that send orders into the market
at high speeds and utilize short holding periods relative to other trading strat-
egies.11 HFT gained traction as technological advances increased the speed
and efficiency with which trades could be executed. The Securities and Ex-
change Commission (“SEC”) characterizes HFTraders as “professional trad-
ners 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 in-
dependent 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 value-
less 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 inevi-
tably becomes the industry’s new benchmark.16 Latency in HFT can be re-
duced by both technological and physical means. Technological

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9. Johannes Prix et al., Algorithmic Trading Patterns in Xetra Orders, 13 EUR. J. FIN
10. Charles M. Jones, What Do We Know About High-Frequency Trading? 18 (Columbia
11. See JONATHAN A. BROGAARD, HIGH FREQUENCY TRADING AND ITS IMPACT ON MAR-
12. SEC Release, supra note 8, at 3606.
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, field programmable gate arrays, and increased bandwidth—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.

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. 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. Such errors can snowball into selloffs that can devastate a company or even an entire market.

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 Philips, 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.


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.

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. 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.

Such competition can be inferred from traders’ willingness to trade on a stock despite its relatively small profit margins.

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. 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.” The trade-through rule requires that every order be executed at the best price available prior to execution. This rule was enacted in response to the 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.


26. See, e.g., id.

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

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.


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


34. Id.
prices reflect the real value of the underlying assets. The logical inference is that not all opportunistic strategies are necessarily harmful strategies. Regulators and academicians 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. 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. 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.

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. To achieve that degree of efficiency, it is not sufficient to only 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).


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 spoofing\textsuperscript{39} or quote stuffing.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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,\textsuperscript{43} and it has brought several high-profile lawsuits against HFT “offenders.”\textsuperscript{44}


\textsuperscript{41} See Korsmo, supra note 31, at 548-49.

\textsuperscript{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.

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

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 HFT traders. 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.”

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. 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. 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.

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45. White, supra note 7.
46. INTERNATIONAL SECURITIES LAW HANDBOOK 504-05 (Jean-Luc Soulier & Marcus Best eds., 2d ed. 2005).
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. 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 HFT traders—"proprietary" traders, or HFT traders who trade with their own capital, and the principals who supervise them—to register with and submit to FINRA oversight.

Members of the House and Senate have also introduced a number of automated trading and HFT-specific proposals during the 113th Congress. 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 HFT traders 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 Rule 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. Currently, sophisticated customers seek direct or sponsored market

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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. 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.”

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.” 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

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.
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 HFT traders, 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

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).
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*, the SEC found that an HFT firm, Athena Capital Research, was illegally manipulating end-of-day market clearing prices. 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 HFT trader, Michael Coscia, for multiple counts of commodity fraud and spoofing. 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.

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 HFT traders. 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.

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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”).


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.”

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. 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.” 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. Policymakers state that, through changes like tick size harmonization, MiFID II will “level[ ] the playing field” to bring fairness to the markets.

1. United Kingdom

The London Stock Exchange (“LSE”) is the largest European exchange. 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

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72. See id.


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

In contrast to the relatively cautious American attitude towards HFT, the United Kingdom (“UK”) seems to encourage HFT activity. The UK’s 2012 Treasury report recommended against many of the regulatory strategies adopted in the U.S.  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.  

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. The FCA explained that the unprecedented penalty reflected the severity of the “impact and nature of the market abuse.”  

British industry participants and lawmakers have pushed back on MiFID II’s restrictive approach, preferring the current regulatory structure, which is a combination of exchange-led monitoring and industry reporting. 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. The FCA’s Director of Markets, David

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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.  
78. See id. at 13-14.  
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 https://www.publications.parliament.uk/pa/ld201213/ldeucom/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.”

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.

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.

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. As of late 2014, no firm had applied for an HFT license in Germany. 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.

grantuality 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.
87. Id. at § 2(a)(4)(d).
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 HFT traders 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 HFT traders 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...

94. Id. at S255 (contending that “[a]lthough the securities regulations in Japan are vast and broad, enforcement problems still remain.”).
96. Id.
97. See Bell & Searles, supra note 92, at 20-23.
within the same day) and by prohibiting daily cancellations of more than 1000 orders. 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” with investors in China. 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.

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.

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


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 opposite exchange.


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).

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, HFT traders 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 HFT traders 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. Although scholarly research has yet to provide conclusive proof that HFT traders with speed-based incentives harm the market, recent experience with market volatility suggests otherwise. If, however, HFT traders 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.

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

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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.


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.grantthornton.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 at 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.


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. As a consequence, all of the orders placed during the finite clearing intervals can be more effectively matched on price before execution. 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. 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.

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). 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.

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. While it would be sim-


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).


118. Id.

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.

2. Transaction Taxes or Fees

Another potential method of reigning in HFT would be the imposition of a transaction tax. 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." The benefits of implementing a transaction tax would be: (1) uniformity across trading platforms and (2) the elimination of the exchanges’ tax exemption loopholes. Ideally, such a tax would push investors towards developing genuine long-term investment strategies, rather than short-term speculative strategies.

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

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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 What’s It All About?, THE TRADING MESH (May 28, 2013, 3:21 AM), http://www.thetradingmesh.com/pg/blog/mike/read92444. 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.


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, 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. Simply placing a fiduciary duty on market makers, however, would be unworkable because proprietary HF-Traders do not have their own customers.

Instead, HF-Traders 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. 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. Without access to liquidity, a quick recovery from a small market hiccup can be stymied, leading to broader market losses. If HF-Traders are required to hold positions during times of duress, liquidity will remain in the market and a complete crash might be avoided.

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. The SEC has taken a step in this direc-

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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 . . . recognized[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-b199-00144feadb0.html#axzz3gdTwfr2II.


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).

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. The rule requires self-regulating organizations—exchanges and members of FINRA—to collect and report market trading data to the SEC.

But while information collection is an important first step, it is worthless if the SEC cannot analyze it effectively. 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.

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, 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

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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. Leuchtkafert to Elizabeth M. Murphy, Secretary of the SEC (May 15, 2014), available at http://blog.themistrading.com/wp-content/uploads/2014/05/Leuchtkafert_MIDAS.pdf (considering MIDAS’s limitations, such as only collecting public information, not accounting for canceled trades, etc.).


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

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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.


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.\textsuperscript{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.\textsuperscript{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 HFTraders 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.\textsuperscript{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.\textsuperscript{152}

\textsuperscript{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.

\textsuperscript{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).

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

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. Others recommend a conservative “wait-and-see” period before implementing potentially restrictive regulations, hoping to guard against the risk of a regulatory overreaction.

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.
